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PUBLIC DOCUMENTS

OF THE

STATE OF CONNECTICUT

VOL. III

1909

Printed by Order of the General Assembly

HARTFORD
1910

NOTE.

Commencing with the documents for the year 1900, a Document Number was assigned to each State departmental report.

This number is determined by the chronological order of the first printed independent issue of such report and will in future be retained by it, thus showing the relative chronological place it occupies in the printed reports of the State.

A list of these reports, with the date of first printed issue and the document number of each, appears on the following page.

Thomas D. Bradstreet.

Comptroller.

CHRONOLOGICAL ORDER OF FIRST PRINTED REPORTS OF DEPARTMENTS.

Document Number.		
1.	Comptroller,	1807
2.	School Fund,	1809
3.	Governor's Message,	1817
4.	State Prison,	1828
5.	Bank Commissioners,	1838
6.	Adjutant-General,	1838
7.	Quartermaster-General,	1839
8.	Board of Education (first issued by Commissioner of Common Schools),	1839
9.	Vital Statistics (first issued by Secretary of State),	1847
10.	Treasurer,	1852
11.	Connecticut School for Boys (Reform School),	1853
12.	Railroad Commissioners,	1854
13.	State Librarian,	1855
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15.	Connecticut School for Imbeciles,	1862
17.	Insurance Commissioner,	1866
18.	State Board of Agriculture,	1866
19.	Fish and Game Commissioners,	1867
20.	Connecticut Hospital for the Insane,	1867
21.	Connecticut Industrial School for Girls,	1870
22.	Indebtedness, rate of tax, etc.,	1874
23.	Bureau of Labor Statistics,	1874
24.	Connecticut Agricultural Experiment Station,	1878
25.	State Board of Health,	1879
26.	Statement of Vote for State Officers,	1880
27.	Criminal Business of Courts,	1880
28.	State Board of Charities,	1882
29.	Connecticut (formerly Storrs) Agricultural College,	1882
30.	Shell-Fish Commissioners,	1882
31.	Estimate of State Expenditures,	1885
32.	Dairy Commissioner,	1887
33.	Factory Inspector,	1887
34.	Storrs Agricultural Experiment Station,	1889
35.	Board of Education of the Blind,	1895
36.	Highway Commissioner,	1897
37.	Building and Loan Commissioner,	1898
38.	Commissioner on Domestic Animals,	1898
40.	Attorney-General,	1900
41.	Commission of Public Records,	1900
42.	Dental Commission,	1901
43.	Israel Putnam Memorial Camp Ground Commissioners,	1902
44.	Connecticut Prison Association *de* Probation Law,	1903
45.	State Police Department,	1903
46.	Mediation and Arbitration,	1901
47.	Geological and Natural History Survey,	1903
48.	Tax Commissioner,	1903
49.	Soldiers' Hospital Board,	1905
50.	Board of Control,	1906
51.	Norwich Hospital for the Insane,	1905
52.	Quadrennial Statement of Property exempt from Taxation,	1910

LIBRARY NOTE.

In order that each department report of the State of Connecticut for a series of years may be quickly located in the bound volumes of Public Documents, the Comptroller has also given each report a Binding Number by which its position in the bound volumes is permanently established, thus enabling each report to be found in the same position and volume from year to year. It should be noted, however, that this arrangement has been interrupted in the volumes of Public Documents covering the odd years, as Chapter 133 of the Public Acts of 1907 provides that only the reports of the Comptroller and Treasurer, and of the Bank, Building and Loan, Insurance, and Railroad Commissioners, respectively, shall be printed annually. On the even years reports are made by all departments.

That these several reports may be placed in the libraries of our several exchanges as soon as convenient after publication, he has provided that the State Librarian shall be supplied with two hundred sets bound in volumes of convenient size, each volume to be bound and labeled in harmony with the regular set and sent out as soon as possible after the printing of the reports belonging therein. This arrangement began with the reports for 1902.

Geo. S. Godard.

State Librarian.

OCTOBER 3, 1910.

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State of Connecticut
PUBLIC DOCUMENT No. 9

Bureau of Vital Statistics

OF THE

State of Connecticut

SIXTY-FIRST REGISTRATION REPORT

OF

Births, Marriages, Divorces and Deaths

FOR THE

YEAR ENDING DECEMBER 31, 1908

PRINTED BY ORDER OF THE LEGISLATURE

HARTFORD:
PUBLISHED BY THE STATE
1909

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PUBLICATION

APPROVED BY

THE BOARD OF CONTROL.

THE TUTTLE, MOREHOUSE & TAYLOR COMPANY, NEW HAVEN, CONN.

STATE BOARD OF HEALTH AND BUREAU OF VITAL STATISTICS.

OFFICE, ROOMS 11, 13 AND 15 CAPITOL, HARTFORD.

EDWARD K. ROOT, M.D., Hartford, President.

THEODORE H. MCKENZIE, ESQ., Southington.

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ARTHUR J. WOLFF, M.D., Hartford.

LOUIS J. PONS, M.D., Roxbury.

JOSEPH H. TOWNSEND, M.D., Secretary, and Superintendent of Registration of Vital Statistics.

Office of the Bureau of Vital Statistics,
Capitol, Hartford, Dec. 21, 1909.

To His Excellency, Frank B. Weeks, *Governor of the State of Connecticut:*

Sir:—In compliance with the laws of the State, I have the honor to present to you the sixty-first report, relating to the births, marriages, divorces and deaths that were registered in Connecticut in the year 1908.

Very respectfully,

JOSEPH H. TOWNSEND, M.D.,
Secretary of the State Board of Health,
and Superintendent of the Registration of Vital Statistics.

A GENERAL SUMMARY OF THE BIRTHS, MARRIAGES AND DEATHS AS REGISTERED IN 1908.

BIRTHS.

SEX.		PARENTAGE.	
Males	13,656	American	8,924
Females	12,977	One or both Foreign	17,434
Not stated	61	Not stated	336
Total	26,694	Total	26,694

Whole number of Births	26,694
Birth-rate per 1,000	25.7

MARRIAGES.

Both parties American	4,171
Both parties Foreign	3,180
Husband American, wife Foreign	539
Husband Foreign, wife American	675
Total Marriages	8,565
Total number of persons married	17,130

DEATHS.

SEX.		NATIVITY.	
Males	8,485	American	11,363
Females	7,513	Foreign	4,383
Not stated	2	Not stated	254
Total	16,000	Total*	16,000

Whole number of Deaths	16,000
Death-rate per 1,000	15.4

There was one birth to every	38.9	persons.
There was one marriage to every	121.2	"
There was one person married to every	60.6	"
There was one death to every	64.8	"

TOWNS IN WHICH THE DEATHS EXCEEDED THE BIRTHS.

The registration of the Vital Statistics of the State is always conducted townwise. Although cities and boroughs are often included within town limits, their population for death-rates, birth-rates, etc., are counted as part of the population in which they are respectively located.

In 26 towns the deaths exceeded the births. The total excess of deaths over births in these towns, or the natural loss of population, was 131. The loss in this way was 72 less than in the previous year.

In 15 towns of less than 1,000 inhabitants the loss was	58
In 7 towns of between 1,000 and 2,000 inhabitants the loss was	37
In 2 towns of between 2,000 and 3,000 inhabitants the loss was	20
In 2 towns of between 3,000 and 4,000 inhabitants the loss was	16
Total	131

In 6 towns the births and deaths were equal, to wit: Canaan, Eastford, Easton, Monroe, Tolland, and Warren.

In 136 towns the births exceeded the deaths.

The towns in which registration shows an excess of deaths over births are the following, arranged by counties:

HARTFORD COUNTY.

Town.	Population.	Deaths.	Births.	Loss.
Marlborough	120	4	2	2

NEW HAVEN COUNTY.

Towns.	Population.	Deaths.	Births.	Loss.
Bethany	491	10	9	1
Cheshire	2,040	31	21	10
Milford	3,760	77	64	13
North Branford	806	19	11	8
	7,097	137	105	32

NEW LONDON COUNTY.

Towns.	Population.	Deaths.	Births.	Loss.
Franklin	515	11	6	5
Ledyard	1,278	15	11	4
Lisbon	816	18	14	4
Lyme	570	11	9	2
North Stonington	1,062	25	16	9
	4,241	80	56	24

FAIRFIELD COUNTY.

Towns.	Population.	Deaths.	Births.	Loss.
New Fairfield	516	13	7	6
Newtown	3,066	47	44	3
Sherman	650	9	8	1
Trumbull	1,700	24	22	2
Weston	894	14	10	4
	6,826	107	91	16

WINDHAM COUNTY.

Town.	Population.	Deaths.	Births.	Loss.
Woodstock	1,924	40	32	8

LITCHFIELD COUNTY.

Towns.	Population.	Deaths.	Births.	Loss.
Barkhamsted	652	14	10	4
Bridgewater	674	12	9	3
Colebrook	353	10	5	5
Cornwall	1,089	21	17	4
Morris	496	9	7	2
Washington	1,969	33	30	3
Woodbury	2,126	35	25	10
	7,359	134	103	31

MIDDLESEX COUNTY.

Town.	Population.	Deaths.	Births.	Loss.
Westbrook	892	21	14	7

TOLLAND COUNTY.

Towns.	Population.	Deaths.	Births.	Loss.
Andover	373	7	3	4
Coventry	1,438	29	22	7
	1,811	36	25	11

The following table gives a summary of the Vital Statistics of the State from 1848, the date of the first Registration Report, up to the present time. Previous to the year 1900 still births are enumerated with the living births—but in that year and following only the living births are counted in the total of births. In the year 1852 no Report of Vital Statistics was published.

TABLE I.

VITAL STATISTICS FROM 1848 TO 1908.

Year.	Births.	Birthrate per 1,000.	Marriages.	Deaths.	Deathrate per 1,000.	Excess of Births over Deaths.	Divorces.	No. Marriages to each Divorce.
1848	6,850	20	2,816	4,379	12.4	2,471	---	----
1849	7,238	20	2,920	5,049	14	2,189	---	----
1850	7,578	20.4	2,884	5,170	14	2,408	---	----
1851	8,362	22	2,995	4,767	13	3,595	---	----
1853	8,302	21.4	3,136	5,596	14.4	2,706	---	----
1854	8,439	21.3	3,202	5,646	14.2	2,793	---	----
1855	10,012	24	4,286	6,094	14.6	3,918	---	----
1856	11,139	25	4,089	6,324	14.9	4,815	---	----
1857	11,355	26	3,647	6,585	16	4,770	---	----
1858	11,299	25	3,737	6,618	15.6	4,681	---	----
1859	11,259	25	3,778	6,533	15	4,726	---	----
1860	11,873	26	4,036	7,602	16.3	4,271	310	13
1861	11,934	25	3,757	7,735	16.5	4,199	275	13.9
1862	10,803	23	3,701	8,541	18	2,262	257	14
1863	9,885	21	3,467	8,442	18	1,443	291	12
1864	9,734	20	4,107	9,109	19	625	426	9.6
1865	10,202	20.8	4,460	7,950	16	2,252	404	11
1866	10,623	23	4,978	7,520	15	4,103	488	10
1867	12,029	23.2	4,779	7,343	14.3	4,686	459	10.4
1868	12,469	23.4	4,784	7,549	15	4,920	478	9.9
1869	12,481	23.5	4,754	8,417	15.6	4,064	491	9.6
1870	13,136	24.2	4,871	8,895	15	4,241	408	11.9
1871	13,114	24	4,882	8,166	14.2	4,948	409	11.9
1872	13,805	25.3	5,023	9,970	18	3,835	464	10.8
1873	14,087	25.6	4,841	9,822	17.4	4,265	457	10.6
1874	14,450	26.2	4,694	8,939	17.2	5,511	492	9.5
1875	14,328	26	4,585	9,833	17	4,495	476	9.4
1876	13,800	25	4,320	10,187	17.5	3,613	396	10.9
1877	14,072	26	4,319	9,696	16	4,376	427	10.1
1878	13,499	24	4,315	9,352	15	4,147	401	10.7
1879	14,051	22.4	4,378	9,394	15	4,657	316	13.7
1880	13,829	22.2	4,745	10,408	16.7	3,421	332	14.2
1881	14,616	22.4	4,850	10,907	17.4	3,709	404	12
1882	14,938	23.9	5,329	11,662	18.7	2,816	392	13.5
1883	15,856	25.4	5,440	11,943	19.1	3,913	433	12.6
1884	15,758	23	5,394	11,351	16.6	4,407	360	14.7
1885	15,496	22.7	5,091	12,033	17.6	3,463	383	13.3
1886	15,984	22.2	5,497	11,616	16.2	4,318	387	14.2
1887	16,583	22.8	5,788	12,385	17	4,198	387	14.9
1888	16,878	22.2	5,969	12,980	17.1	3,898	430	13.8
1889	17,176	23.4	5,744	12,529	17	4,647	536	10.7
1890	17,394	23.3	6,284	13,665	18.3	3,729	477	13.1
1891	18,557	24.8	6,486	14,385	19.2	4,172	475	13.6
1892	19,750	24.7	6,596	15,170	19	4,580	501	13.1
1893	20,296	25.4	6,459	14,901	18.6	5,395	390	16.5
1894	20,345	24.9	5,830	13,699	16.8	6,646	367	15.8
1895	19,931	24.4	6,623	14,546	17.8	5,385	417	15.8
1896	21,324	24.9	6,716	15,025	17.5	6,299	449	14.9
1897	20,580	23.3	6,461	13,915	15.7	6,665	403	16.0
1898	21,023	23.5	6,565	14,170	15.8	6,853	429	15.3
1899	20,855	22.6	6,843	14,381	15.7	6,474	481	15.8
1900	20,560	22.6	6,991	16,368	18.0	4,192	452	15.4
1901	20,294	22.3	7,112	14,856	16.2	5,438	511	13.9
1902	21,216	22.5	7,660	14,336	15.2	6,880	462	16.5
1903	21,751	22.7	8,078	15,490	16.1	6,261	535	15.0
1904	22,864	23.4	7,635	15,711	16.1	7,153	477	16.0
1905	23,271	23.5	8,075	16,298	16.4	6,973	491	16.4
1906	24,641	24.4	9,072	16,766	16.6	7,875	575	15.7
1907	25,945	25.3	9,763	17,490	17.1	8,455	596	16.3
1908	26,694	25.7	8,565	16,000	15.4	10,694	559	15.3

TABLE II.—HARTFORD COUNTY.

BIRTHS, MARRIAGES AND DEATHS IN THE SEVERAL TOWNS FOR THE YEAR ENDING DECEMBER 31, 1907.

TOWNS.	Estimated Population.	BIRTHS.											MARRIAGES.								DEATHS.							
		SEX.					PARENTAGE.						NATIVITY.								SEX.				NATIVITY.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both American.	Both Foreign.	Amer. Mother. For. Father.	Amer. Father. For. Mother.	Both Foreign of diff. Nations.	Not stated.	Both American.	Both Foreign.	Husb. American Wife Foreign.	Husb. Foreign. Wife American.	Not stated.	Total.	Husband non-resident.	Both non-resident.	Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated.	Death-rate per 1,000.
Hartford	101,150	1190	1179	--	2369	23.4	818	1160	146	152	90	3	422	306	63	70	--	861	146	163	804	645	--	*1459	981	460	18	12.3
Avon	1,400	10	14	--	24	17.1	8	11	2	----	2	1	1	1	----	1	--	3	2	----	7	5	--	12	6	6	--	8.5
Berlin	4,126	38	31	--	69	16.7	37	22	3	3	3	1	11	6	----	3	--	20	7	2	20	14	--	34	22	12	--	8.2
Bloomfield	1,677	11	8	--	19	11.3	10	3	----	1	1	4	4	1	----	1	--	6	4	----	5	10	--	15	13	2	--	8 9
Bristol	11,450	162	164	--	326	28.4	91	197	21	15	2	--	53	32	14	11	--	110	16	7	82	80	--	162	119	42	1	14.1
Burlington	1,151	28	20	--	48	41.7	11	33	1	2	1	--	3	----	----	----	--	3	3	----	18	11	--	29	25	4	--	24.9
Canton	2,820	32	31	--	63	22.3	25	25	4	6	1	2	10	13	----	3	--	26	6	9	27	15	--	42	34	7	1	14.8
East Granby	702	7	5	3	15	21.3	11	1	----	2	1	--	3	----	----	----	--	3	1	----	4	4	--	8	6	1	1	11.3
East Hartford	7,966	86	89	--	175	21.9	103	37	11	16	8	--	33	6	7	4	--	50	17	10	38	44	--	82	64	17	1	10.2
East Windsor	3,372	43	28	--	71	21.0	26	25	10	8	2	--	10	4	1	2	--	17	6	3	25	25	--	50	36	14	--	14.8
Enfield	6,300	159	123	--	282	44.7	68	178	9	18	8	1	46	63	14	6	--	129	25	42	62	62	--	124	89	34	1	19.6
Farmington	3,452	23	28	--	51	14.7	20	19	3	4	4	1	10	6	1	1	--	18	1	5	20	24	--	44	29	15	--	12.7
Glastenbury	4,900	60	43	--	103	21.0	38	51	4	5	5	--	17	8	----	----	--	25	6	1	31	33	--	64	44	19	1	8.9
Granby	1,340	6	12	2	20	14.9	12	6	----	----	1	1	4	----	----	----	--	4	3	----	8	8	--	16	14	1	1	11.9
Hartland	613	7	5	--	12	19.5	8	1	1	----	----	2	2	1	1	----	--	4	2	1	8	2	--	10	10	----	--	16.3
Manchester	12,504	165	129	2	296	23.6	91	137	29	19	20	--	29	45	14	16	--	104	24	9	64	49	--	113	68	44	1	9.0
Marlborough	120	1	1	--	2	16.6	1	----	1	----	----	--	1	----	----	----	--	1	1	----	3	1	--	4	2	2	--	33.3
New Britain	35,560	637	599	3	1239	34.8	277	819	50	52	37	4	100	301	23	17	--	441	63	68	307	241	--	*548	375	167	6	15.1
Newington	1,110	15	14	--	29	26.1	13	10	2	2	2	--	6	----	1	1	--	8	3	5	9	9	--	18	14	3	1	17.2
Plainville	2,345	23	27	--	50	21.3	21	20	6	1	1	1	13	3	----	1	--	17	4	4	18	13	--	31	23	8	--	13.2
Rocky Hill	992	16	8	--	24	24.1	12	11	----	----	1	--	2	----	1	----	--	3	1	2	6	8	--	14	13	1	--	14.1
Simsbury	2,270	22	30	--	52	22.9	20	14	4	4	1	9	15	13	----	2	--	30	3	7	18	23	--	*41	31	6	4	15.8
Southington	6,200	85	75	--	160	25.8	40	102	3	8	5	2	18	11	1	6	--	36	7	6	33	39	--	72	55	17	--	11.6
South Windsor	2,236	23	19	1	43	19.2	22	13	4	2	1	1	2	----	1	----	--	3	1	----	11	11	--	22	14	7	1	9.8
Suffield	3,800	43	48	1	92	24.2	46	33	3	6	2	2	11	5	2	1	--	19	3	7	28	29	--	57	46	10	1	15.0
West Hartford	4,190	38	35	--	73	17.4	31	27	8	6	1	--	10	2	1	----	--	13	5	4	28	38	--	66	38	28	--	15.7
Wethersfield	2,930	19	24	1	44	15.0	23	10	3	6	2	--	7	1	1	2	--	11	2	4	24	10	--	*34	19	7	8	7.8
Windsor	4,142	52	44	--	96	23.1	52	32	3	5	4	--	23	13	2	1	--	39	8	6	33	27	--	60	49	11	--	14.4
Windsor Locks	3,305	56	48	--	104	31.4	26	68	4	4	2	--	11	20	4	8	--	43	7	15	23	17	--	40	29	11	--	12.1
Total	234,123	3057	2881	13	5951	25.4	1961	3065	335	347	208	35	877	861	152	157	--	2047	377	380	1774	1497	--	3271	2268	956	47	13.9

*Deaths of non-residents in public institutions: Hartford, 211; New Britain, 8; Simsbury, 5; Wethersfield, 11; deducted from total in estimating death-rate.

TABLE II.—NEW HAVEN COUNTY—1908.

TOWNS.	Estimated Population.	BIRTHS.											MARRIAGES.								DEATHS.							
		SEX.					PARENTAGE.						NATIVITY.								SEX.				NATIVITY.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both American.	Both Foreign.	Amer. Mother. For. Father.	Amer. Father. For. Mother.	Both Foreign of diff. Nations.	Not stated.	Both American.	Both Foreign.	Husb. American. Wife Foreign.	Husb. Foreign. Wife American.	Not stated.	Total.	Husband non-resident.	Both non-resident.	Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated.	Death-rate per 1,000.
New Haven	125,620	1805	1728	--	3533	28.1	942	2110	199	181	94	7	522	437	79	92	--	1130	142	144	1158	963	--	*2121	1417	678	26	16.0
Ansonia	14,550	240	216	1	457	31.4	96	282	36	29	13	1	49	65	6	8	--	128	18	33	115	97	--	212	151	58	3	14.5
Beacon Falls	720	14	21	--	35	48.6	11	17	3	2	2	---	3	9	1	----	--	13	1	2	10	3	--	13	7	5	1	18.0
Bethany	491	5	4	--	9	18.5	6	3	---	----	----	---	----	----	----	----	--	----	----	---	7	3	--	10	8	1	1	20.3
Branford	6,700	95	77	--	172	25.6	41	96	12	13	9	1	15	23	5	2	--	45	5	8	45	35	--	80	59	20	1	11.9
Cheshire	2,040	12	9	--	21	10.2	14	3	2	1	1	---	8	----	2	1	--	11	3	5	18	13	--	31	27	4	--	15.1
Derby	9,500	149	172	6	327	34.6	52	225	23	15	10	2	29	63	4	6	--	102	22	27	55	64	--	119	83	36	--	12.5
East Haven	1,336	16	17	--	33	24.7	16	12	3	2	----	---	5	----	----	1	--	6	2	3	9	10	--	19	16	2	1	14.2
Guilford	2,790	25	20	1	46	16.4	28	9	1	6	2	---	15	4	1	1	--	21	2	6	21	22	--	43	38	3	2	15.4
Hamden	5,220	71	61	--	132	25.2	54	67	5	2	3	1	15	4	2	2	--	23	6	8	28	36	--	64	47	16	1	12.2
Madison	1,590	10	16	--	26	16.3	9	10	4	3	----	---	3	2	----	----	--	5	----	---	9	15	--	24	18	6	--	15.0
Meriden	31,315	410	356	--	766	24.4	205	402	75	44	37	3	103	56	16	22	--	197	38	19	235	205	--	*440	285	153	2	13.8
Middlebury	872	8	12	--	20	22.9	14	3	3	----	---	---	3	----	----	----	--	3	----	2	6	5	--	11	7	3	1	12.6
Milford	3,760	36	27	1	64	17.0	36	20	2	2	4	---	26	5	2	4	--	37	10	11	43	34	--	77	60	14	3	20.4
Naugatuck	14,000	178	194	--	372	26.5	88	224	27	21	11	1	30	54	1	2	--	87	20	4	65	57	--	122	82	40	--	8.7
North Branford	806	6	5	--	11	13.6	8	2	1	----	----	---	7	----	----	----	--	7	2	1	11	8	--	19	17	1	1	23.5
North Haven	2,405	27	29	--	56	23.2	19	32	3	1	1	---	4	2	----	1	--	7	2	3	18	14	--	32	26	6	--	13.3
Orange	8,960	95	71	2	168	18.7	102	36	9	13	4	4	45	1	1	4	--	51	17	14	59	54	--	113	91	21	1	12.6
Oxford	1,000	6	8	--	14	14.0	7	4	1	2	----	---	8	----	----	2	--	10	1	2	8	3	--	11	11	--	--	11.0
Prospect	655	2	4	--	6	9.1	4	--	1	----	----	1	---	----	----	----	--	----	----	---	2	1	--	3	1	2	--	4.5
Seymour	3,733	74	66	--	140	37.5	29	87	7	6	11	---	15	16	3	----	--	34	7	5	28	35	--	63	45	18	--	16.8
Southbury	1,357	8	11	1	20	14.7	15	2	2	1	----	---	5	----	1	----	--	6	1	3	10	8	--	18	11	6	1	13.2
Wallingford	10,935	160	138	--	298	27.2	68	164	21	28	16	1	26	29	4	8	--	67	14	2	85	60	--	145	108	36	1	13.2
Waterbury	65,490	1098	1003	2	2103	32.1	586	1191	149	122	48	7	207	269	25	43	--	544	49	28	577	478	1	*1056	738	313	5	15.8
Wolcott	628	8	8	--	16	25.4	13	1	----	----	----	2	5	----	----	----	--	5	2	1	7	7	--	14	12	2	--	22.2
Woodbridge	800	12	10	--	22	27.5	10	8	1	3	----	---	2	----	----	----	--	2	1	---	4	7	--	11	9	2	--	13.7
Total	317,263	4570	4283	14	8867	27.9	2473	5010	590	497	266	31	1150	1039	153	199	--	2541	365	331	2633	2237	1	4871	3374	1446	51	15.3

*Deaths of non residents in public institutions: New Haven, 109; Meriden, 7; Waterbury, 18; deducted from total in estimating death-rate.

TABLE II.—NEW LONDON COUNTY—1908.

TOWNS.	Estimated Population.	BIRTHS.											MARRIAGES.								DEATHS.							
		SEX.					PARENTAGE.						NATIVITY.								SEX.				NATIVITY.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both American.	Both Foreign.	Amer. Mother. For. Father.	Amer. Father. For. Mother.	Both Foreign of diff. Nations.	Not stated.	Both American.	Both Foreign.	Husb. American Wife Foreign.	Husb. Foreign. Wife American.	Not stated.	Total.	Husband non-resident.	Both non-resident.	Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated.	Death-rate per 1,000.
New London	20,580	259	256	1	516	25.0	226	223	23	32	10	2	135	55	11	16	--	217	40	39	153	165	--	*318	225	82	11	15.0
Bozrah	635	4	9	2	15	23.6	5	7	2	1	----	--	----	----	----	----	--	----	----	----	6	3	--	9	5	4	--	14.1
Colchester	1,200	31	18	--	49	40.8	12	35	----	2	----	--	16	13	----	----	--	29	8	13	19	24	--	43	28	15	--	35.8
East Lyme	1,670	20	22	--	42	25.1	24	12	2	3	1	--	10	2	----	----	--	12	4	4	12	21	--	33	27	4	2	19.7
Franklin	515	4	2	--	6	11.6	4	1	----	----	1	--	----	----	----	----	--	----	----	----	6	5	--	11	7	4	--	21.3
Griswold	3,800	56	66	--	122	32.1	34	55	15	11	6	1	13	17	1	3	--	34	8	----	30	38	--	68	45	21	2	17.8
Groton	6,300	79	67	--	146	23.0	89	35	9	9	4	--	30	5	----	2	--	37	9	3	66	55	--	121	102	17	2	19.2
Lebanon	1,402	12	14	--	26	18.5	14	7	1	2	2	--	7	2	----	----	--	9	7	----	9	13	--	22	20	1	1	15.6
Ledyard	1,278	6	5	--	11	8.5	5	2	1	----	----	3	3	---	----	----	--	3	----	1	9	6	--	15	14	1	--	11.7
Lisbon	816	3	11	--	14	17.1	6	4	----	2	1	1	1	---	----	----	--	1	----	1	13	5	--	18	15	3	--	22.0
Lyme	570	1	8	--	9	15.7	7	----	1	1	----	--	3	1	1	----	--	5	----	1	6	5	--	11	8	3	--	19.2
Montville	2,435	22	20	--	42	17.2	19	17	3	3	----	--	6	6	1	----	--	13	2	1	25	15	--	40	32	8	--	16.4
Norwich	25,910	300	307	1	608	23.4	187	290	59	43	26	3	112	93	17	11	--	233	38	45	216	230	--	*446	304	137	5	16.4
No. Stonington	1,062	7	8	1	16	15.0	16	----	----	----	----	--	10	---	----	----	--	10	4	3	17	8	--	25	22	----	3	23.5
Old Lyme	1,070	10	12	--	22	20.5	15	1	2	3	----	1	4	---	----	1	--	5	----	1	9	7	--	16	11	5	--	14.9
Preston	3,008	5	7	--	12	3.9	7	4	----	1	---	--	4	---	----	----	--	4	2	----	23	22	--	*45	29	11	5	4.5
Salem	460	3	9	--	12	26.0	7	5	----	----	----	--	3	---	----	----	--	3	----	----	2	2	--	4	4	----	--	8.6
Sprague	1,525	22	30	--	52	33.4	20	15	10	6	1	--	10	5	1	----	--	16	2	2	23	16	--	39	27	12	--	25.5
Stonington	9,630	109	93	--	202	20.9	87	69	18	21	7	--	26	25	5	9	--	65	13	6	62	72	--	134	101	32	1	13.9
Voluntown	722	4	9	--	13	18.0	9	2	1	1	----	--	5	---	1	----	--	6	3	----	9	2	--	11	7	3	1	15.2
Waterford	3,100	28	23	1	52	16.7	28	17	3	3	1	--	9	1	----	----	--	10	1	1	22	15	--	37	31	6	--	11.9
Total	87,688	985	996	6	1987	22.6	821	801	150	144	60	11	407	225	38	42	--	712	141	121	737	729	--	1466	1064	369	33	16.7

*Deaths of non-residents in public institutions: New London, 9; Norwich, 26; Preston, 31; deducted from total in estimating death-rate.

TABLE II.—FAIRFIELD COUNTY—1908.

TOWNS.	Estimated Population.	BIRTHS.											MARRIAGES.								DEATHS.							
		SEX.					PARENTAGE.						NATIVITY.								SEX.				NATIVITY.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both American.	Both Foreign.	Amer. Mother. For. Father.	Amer. Father. For. Mother.	Both Foreign of diff. Nations.	Not stated.	Both American.	Both Foreign.	Husb. American Wife Foreign.	Husb. Foreign. Wife American.	Not stated.	Total.	Husband non-resident.	Both non-resident.	Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated.	Death-rate per 1,000.
Danbury	19,475	225	240	--	465	23.8	232	168	37	9	14	5	123	32	7	23	--	185	28	10	180	160	--	*340	234	99	7	16.6
Bridgeport	88,700	1385	1286	2	2673	30.1	671	1640	162	109	71	20	351	423	47	65	--	886	104	123	718	679	--	*1397	970	401	26	15.3
Bethel	3,270	28	37	--	65	19.9	49	8	----	1	4	3	17	1	----	1	--	19	5	1	17	31	--	48	36	10	2	14.6
Brookfield	1,090	9	7	--	16	14.7	12	3	1	----	----	---	---	---	----	----	--	----	----	----	6	5	--	11	9	1	1	10.0
Darien	3,790	33	33	--	66	17.4	32	19	3	9	2	1	19	1	3	1	--	24	10	8	86	17	--	*103	75	25	3	11.6
Easton	928	7	6	1	14	15.0	7	3	2	1	----	1	3	1	----	----	--	4	3	----	4	10	--	14	14	----	--	15.0
Fairfield	5,000	47	50	1	98	19.6	40	45	2	5	5	1	16	4	2	1	--	23	11	3	37	39	--	76	54	18	4	15.2
Greenwich	13,800	160	139	--	299	21.6	143	97	19	19	19	2	94	70	6	12	--	182	29	64	145	132	-	*277	195	76	6	19.8
Huntington	6,830	67	75	2	144	21.0	62	56	12	11	2	1	23	10	----	6	--	39	16	6	43	36	--	79	61	16	2	11.5
Monroe	1,082	4	7	--	11	10.1	6	3	----	----	----	2	3	1	1	----	--	5	2	----	7	4	--	11	8	3	--	10.1
New Canaan	3,180	42	19	--	61	19.1	34	19	3	3	1	1	23	7	----	----	--	30	7	4	25	18	--	43	35	8	--	13.5
New Fairfield	516	3	4	--	7	13.5	4	2	1	----	----	---	2	---	----	----	--	2	----	----	8	5	--	13	10	2	1	25.1
Newtown	3,066	22	22	--	44	14.3	28	11	2	2	----	1	12	2	----	5	--	19	4	6	25	22	--	47	32	13	2	15.3
Norwalk	21,680	220	213	--	433	19.9	224	143	26	25	15	---	100	55	12	17	--	184	34	32	186	180	--	*366	262	99	5	16.6
Redding	1,330	9	12	1	22	16.5	13	6	2	----	1	---	5	1	----	2	--	8	1	1	15	4	--	19	16	3	--	14.2
Ridgefield	2,938	30	27	--	57	19.4	27	18	3	7	1	1	10	2	----	----	--	12	2	3	16	16	--	32	27	5	--	14.2
Sherman	650	4	4	--	8	12.3	4	2	1	1	----	---	2	---	----	----	--	2	----	1	4	5	--	9	6	3	--	13.8
Stamford	21,350	466	454	1	921	43.0	221	378	52	46	25	199	173	74	24	23	--	294	42	98	233	205	--	*438	317	111	10	19.0
Stratford	4,500	43	52	--	95	21.1	40	35	8	5	7	---	21	4	2	1	--	28	10	6	44	42	--	86	65	21	--	19.1
Trumbull	1,700	13	9	--	22	12.9	17	1	1	2	1	---	2	---	----	1	--	3	3	----	14	10	--	24	23	1	--	14.1
Weston	894	4	6	--	10	11.1	7	2	----	1	----	---	3	---	----	1	--	4	1	----	6	8	--	14	12	2	--	15.6
Westport	4,260	28	31	--	59	13.8	30	19	2	4	4	---	20	3	----	2	--	25	6	2	43	50	--	*93	66	27	--	21.8
Wilton	1,500	15	17	--	32	21.3	23	5	2	----	2	---	7	1	1	----	--	9	3	2	14	9	--	23	17	5	1	15.3
Total	211,529	2864	2750	8	5622	26.5	1926	2683	341	260	174	238	1029	692	105	161	--	1987	321	370	1876	1687	--	3563	2544	949	70	16.8

*Deaths of non-residents in public institutions: Bridgeport, 39; Danbury, 16; Darien, 59; Greenwich, 3; Norwalk, 6; Stamford, 31; Westport, 12; deducted from total in estimating death-rate.

TABLE II.—WINDHAM COUNTY—1908.

TOWNS.	Estimated Population.	BIRTHS.											MARRIAGES.								DEATHS.							
		SEX.					PARENTAGE.						NATIVITY.								SEX.				NATIVITY.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both American.	Both Foreign.	Amer. Mother. For. Father.	Amer. Father. For. Mother.	Both Foreign of diff. Nations.	Not stated.	Both American.	Both Foreign.	Husb. American. Wife Foreign.	Husb. Foreign. Wife American.	Not stated.	Total.	Husband non-resident.	Both non-resident.	Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated.	Death-rate per 1,000.
Brooklyn	2,142	24	16	--	40	18.6	11	17	7	4	1	--	11	4	----	----	--	15	4	8	19	15	--	34	24	10	--	15.8
Ashford	741	14	4	--	18	24.2	12	5	----	1	----	--	4	----	----	----	--	4	----	3	8	7	--	15	14	1	--	20.2
Canterbury	820	4	6	--	10	12.1	8	----	----	2	----	--	2	----	----	----	--	2	1	----	4	3	--	7	4	3	--	8.5
Chaplin	520	6	9	--	15	28.8	10	2	2	----	1	--	3	----	----	----	--	3	2	----	2	3	--	5	4	1	--	9.6
Eastford	493	7	2	--	9	18.2	8	1	----	----	----	--	3	----	----	----	--	3	1	----	5	4	--	9	8	1	--	18.2
Hampton	627	9	3	--	12	19.1	9	----	----	2	----	1	5	----	----	1	--	6	4	----	7	3	--	10	6	3	1	15.9
Killingly	6,682	79	76	--	155	23.1	59	54	17	22	3	--	38	8	7	4	--	57	11	8	64	60	--	124	100	21	3	18.5
Plainfield	5,010	82	63	--	145	28.9	44	51	21	26	2	1	20	9	8	7	--	44	8	8	32	42	--	74	49	25	--	14.7
Pomfret	2,120	22	22	--	44	20.7	30	5	2	6	----	1	3	1	----	----	--	4	1	1	9	6	--	15	13	2	--	7.0
Putnam	8,016	89	68	--	157	19.5	70	33	34	19	----	1	46	7	7	16	--	76	11	22	53	51	1	*105	73	28	4	12.2
Scotland	443	6	5	1	12	27.0	7	1	1	2	1	--	----	1	----	2	--	3	----	1	3	5	--	8	8	----	--	18.0
Sterling	1,335	14	26	--	40	29.9	23	8	8	1	----	--	7	----	----	----	--	7	1	1	9	11	--	20	19	1	--	14.9
Thompson	7,130	72	65	--	137	19.2	33	79	15	8	1	1	9	7	5	9	--	30	5	6	33	38	--	71	46	25	--	9.9
Windham	10,220	129	137	1	267	26.1	115	96	25	21	8	2	53	34	2	7	--	96	17	12	101	109	--	*210	147	60	3	19.9
Woodstock	1,924	17	15	--	32	16.6	20	7	1	3	1	--	11	----	1	----	--	12	1	2	21	19	--	40	34	5	1	20.7
Total	48,223	574	517	2	1093	22.6	459	359	133	117	18	7	215	71	30	46	--	362	67	72	370	376	1	747	549	186	12	15.4

*** Deaths of non-residents in public institutions: Putnam, 7; Windham, 6; deducted from total in estimating death-rate.**

TOWNS.	Estimated Population.	BIRTHS.											MARRIAGES.								DEATHS.							
		SEX.					PARENTAGE.						NATIVITY.								SEX.				NATIVITY.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both American.	Both Foreign.	Amer. Mother. For. Father.	Amer. Father. For. Mother.	Both Foreign of diff. Nations.	Not stated.	Both American.	Both Foreign.	Husb. American. Wife Foreign.	Husb. Foreign. Wife American.	Not stated.	Total.	Husband non-resident.	Both non-resident.	Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated.	Death-rate per 1,000.
Litchfield	3,142	32	25	--	57	18.1	41	7	----	7	2	--	16	4	----	1	--	21	5	6	28	17	--	45	34	11	--	14.3
Barkhamsted	652	6	4	--	10	15.3	9	1	----	----	----	--	1	---	----	----	--	1	1	----	8	6	--	14	13	----	1	21.4
Bethlehem	602	4	4	--	8	13.2	4	2	2	----	----	--	1	---	----	----	--	1	1	----	2	3	--	5	4	1	--	8.3
Bridgewater	674	7	2	--	9	13.3	4	4	----	1	----	--	----	---	----	----	--	----	----	----	6	6	--	12	10	2	--	17.8
Canaan	700	9	4	--	13	18.5	10	1	1	----	1	--	4	---	----	----	--	4	----	2	7	6	--	13	8	4	1	18.5
Colebrook	353	1	4	--	5	14.1	3	----	---	2	----	--	4	---	1	----	--	5	----	----	5	5	--	10	7	2	1	2.8
Cornwall	1,089	11	6	--	17	15.6	10	5	1	----	----	1	5	---	----	1	--	6	2	1	11	10	--	21	16	3	2	19.2
Goshen	726	4	5	--	9	12.3	6	1	2	----	----	--	2	---	----	----	--	2	1	----	3	3	--	6	6	----	--	8.2
Harwinton	1,429	30	19	--	49	34.3	11	30	4	4	----	--	3	---	----	2	--	5	2	----	9	11	--	20	16	3	1	13.9
Kent	1,090	10	14	--	24	22.0	16	6	1	1	----	--	2	---	----	----	--	2	1	----	6	3	--	9	9	----	--	8.2
Morris	496	6	1	--	7	14.1	5	2	----	----	----	--	----	---	----	----	--	----	----	----	3	6	--	9	6	3	--	18.1
New Hartford	3,635	16	22	--	38	10.4	11	24	1	2	----	--	8	7	2	3	--	20	5	5	16	13	--	29	20	9	--	7.9
New Milford	5,513	70	54	1	125	22.6	65	47	3	7	3	--	29	2	1	----	--	32	6	6	40	31	--	71	66	5	--	12.8
Norfolk	1,668	19	11	--	30	17.9	16	7	3	4	----	--	5	1	----	----	--	6	1	3	11	13	--	24	19	5	..	14.3
North Canaan	1,899	23	24	1	48	25.2	25	20	1	2	----	--	11	3	----	1	--	15	4	5	14	8	--	22	17	5	--	11.5
Plymouth	3,372	66	90	2	158	46.8	31	109	7	7	3	1	9	22	----	----	--	31	4	----	19	28	--	47	35	11	1	13.9
Roxbury	1,207	13	14	--	27	22.3	13	12	----	1	1	--	5	2	----	----	--	7	3	----	9	6	--	15	13	2	--	12.4
Salisbury	3,544	22	21	1	44	12.4	22	10	5	2	4	1	24	2	----	3	--	29	6	9	35	27	--	*62	52	6	4	15.8
Sharon	1,849	24	11	--	35	18.9	28	5	----	1	----	1	10	---	----	----	--	10	1	3	16	11	--	27	25	2	--	14.6
Thomaston	3,317	55	38	--	93	28.0	36	41	10	6	----	--	14	2	2	1	--	19	7	3	24	17	--	41	31	10	--	12.3
Torrington	17,580	219	226	--	445	25.3	128	252	32	22	11	--	41	66	15	13	--	135	19	8	89	93	--	182	139	43	--	10.3
Warren	396	2	6	--	8	20.2	8	----	----	----	----	--	4	---	----	----	--	4	----	----	6	2	--	8	7	----	1	20.3
Washington	1,969	17	13	--	30	15.2	8	14	3	1	2	2	7	2	1	1	--	11	3	2	23	10	--	33	24	9	--	16.7
Watertown	3,721	42	37	--	79	21.2	45	14	4	10	6	--	11	3	3	2	--	19	7	4	24	27	--	51	39	12	--	13.7
Winchester	9,030	95	97	--	192	21.2	104	60	16	11	1	--	41	14	4	3	--	62	19	3	75	55	--	*130	85	37	8	14.3
Woodbury	2,126	8	17	--	25	11.7	16	2	1	4	----	2	6	1	1	2	--	10	5	1	22	13	--	35	32	1	2	13.0
Total	71,779	811	769	5	1585	22.0	675	676	97	95	34	8	263	131	30	33	--	457	103	61	511	430	--	941	733	186	22	13.1

*** Deaths of non-residents in public institutions: Salisbury, 6; Winchester, 12; deducted from total in estimating death-rate.**

TABLE II.—MIDDLESEX COUNTY—1908.

TOWNS.	Estimated Population.	BIRTHS.											MARRIAGES.								DEATHS.							
		SEX.					PARENTAGE.						NATIVITY.								SEX.				NATIVITY.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both American.	Both Foreign.	Amer. Mother. For. Father.	Amer. Father. For. Mother.	Both Foreign of diff. Nations.	Not stated.	Both American.	Both Foreign.	Husb. American. Wife Foreign.	Husb. Foreign. Wife American.	Not stated.	Total.	Husband non-resident.	Both non-resident.	Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated.	Death-rate per 1,000.
Middletown	19,310	262	248	--	510	26.4	156	286	25	23	19	1	69	89	7	4	--	169	43	19	226	210	--	*436	291	137	8	13.2
Haddam	1,951	22	21	--	43	22.0	15	23	----	2	2	1	3	4	----	1	--	8	2	----	18	16	--	34	29	5	--	17.4
Chatham	2,528	13	17	--	30	11.8	16	9	3	1	1	--	6	1	----	3	--	10	4	2	16	10	--	26	20	6	--	10.2
Chester	1,349	15	11	--	26	19.2	18	6	2	----	----	--	6	9	1	4	--	20	----	9	7	10	--	17	12	4	1	12.6
Clinton	1,465	8	16	--	24	16.3	17	2	2	3	----	--	5	---	1	----	--	6	3	----	5	6	--	11	10	----	1	7.5
Cromwell	2,066	24	27	--	51	24.6	16	23	7	3	2	--	6	---	----	1	--	7	4	1	8	19	--	27	16	11	--	13.0
Durham	906	6	10	--	16	17.6	9	4	1	2	----	--	4	---	----	1	--	5	2	1	6	6	--	12	11	1	--	13.2
East Haddam	2,394	19	22	--	41	17.1	15	22	----	2	2	--	6	---	----	1	--	7	----	2	20	19	--	39	29	8	2	12.1
Essex	2,926	39	27	3	69	23.5	34	26	2	7	----	--	6	2	1	----	--	9	3	2	16	16	--	32	29	3	--	10.9
Killingworth	706	9	6	--	15	21.2	2	9	2	1	1	--	1	2	----	----	--	3	1	----	2	4	--	6	4	2	--	8.4
Middlefield	720	19	11	--	30	41.6	14	10	1	2	3	--	2	1	----	----	--	3	1	----	3	9	--	12	10	2	--	16 6
Old Saybrook	1,389	13	15	--	28	20.1	14	10	1	3	----	--	6	---	----	----	--	6	1	3	8	9	--	17	14	3	--	12.2
Portland	3,192	39	40	--	79	24.7	25	36	7	5	6	--	13	5	2	2	--	22	4	3	37	15	--	52	36	16	--	16.2
Saybrook	1,754	20	16	--	36	20.5	12	16	5	----	3	--	7	1	----	----	--	8	3	1	10	10	--	20	17	3	--	11.4
Westbrook	892	6	8	--	14	15.7	8	3	2	1	----	--	4	---	1	1	--	6	2	----	11	10	--	21	21	----	--	23.5
Total	43,548	514	495	3	1012	23.2	371	485	60	55	39	2	144	114	13	18	--	289	73	43	393	369	--	762	549	201	12	17.4

* Deaths of non-residents in public institutions: Middletown, 180; deducted from total in estimating death-rate.

TABLE II.—TOLLAND COUNTY—1908.

TOWNS.	Estimated Population.	BIRTHS.											MARRIAGES.								DEATHS.							
		SEX.					PARENTAGE.						NATIVITY.								SEX.				NATIVITY.			
		Male.	Female.	Not stated.	Total.	Birth-rate per 1,000.	Both American.	Both Foreign.	Amer. Mother. For. Father.	Amer. Father. For. Mother.	Both Foreign of diff. Nations.	Not stated.	Both American.	Both Foreign.	Husb. American Wife Foreign.	Husb. Foreign. Wife American.	Not stated.	Total.	Husband non-resident.	Both non-resident.	Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated.	Death-rate per 1,000.
Tolland	1,036	10	11	--	21	20.2	12	5	2	2	----	--	2	1	2	----	--	5	2	2	10	11	--	21	17	4	--	20.2
Andover	373	----	3	--	3	8.0	3	----	----	----	----	--	1	---	----	1	--	2	1	1	3	4	--	7	6	1	--	18.7
Bolton	461	6	5	--	11	23.8	4	4	1	----	1	1	1	---	----	----	--	1	----	1	2	3	--	5	2	3	--	10.8
Columbia	587	6	6	--	12	20.4	7	4	1	----	----	--	6	---	----	----	--	6	----	1	5	5	--	10	7	2	1	17.0
Coventry	1,438	9	12	1	22	15.2	15	5	----	1	----	1	4	---	----	----	--	4	1	1	19	10	--	29	25	3	1	20.0
Ellington	2,061	25	16	--	41	19.8	13	23	4	1	----	--	7	1	2	1	--	11	5	2	16	12	--	28	23	4	1	13.5
Hebron	998	11	10	5	26	26.0	15	6	3	1	1	--	4	1	2	----	--	7	1	2	7	6	--	13	12	1	--	13.0
Mansfield	1,761	20	19	--	39	22.1	21	6	6	2	2	2	4	---	----	----	--	4	----	1	14	12	--	26	21	5	--	14.7
Somers	1,741	14	17	2	33	18.9	13	19	----	1	----	--	4	2	----	----	--	6	----	1	9	14	--	23	20	3	--	13.1
Stafford	4,107	74	60	--	134	32.6	47	64	14	7	2	--	19	13	5	5	--	42	3	3	39	34	--	73	54	17	2	17.7
Union	426	3	8	--	11	25.8	6	2	1	2	----	--	---	---	----	----	--	----	----	----	3	4	--	7	4	3	--	16.4
Vernon	8,230	90	105	2	197	23.9	74	79	17	13	14	--	33	27	7	11	--	78	24	4	59	59	--	118	75	42	1	14.3
Willington	869	13	14	--	27	31.0	8	14	3	1	1	--	1	2	----	1	--	4	2	1	5	14	--	19	16	2	1	10.3
Total	24,087	281	286	10	577	23.9	238	231	52	31	21	4	86	47	18	19	--	170	39	20	191	188	--	379	282	90	7	15.7

TABLE III.—RECAPITULATION BY COUNTIES—1908.

COUNTIES.	Estimated Population.	BIRTHS.											MARRIAGES.								DEATHS.							
		SEX.				Birth-rate per 1,000.	PARENTAGE.						NATIVITY.						Husband non-resident.	Both non-resident.	SEX.				NATIVITY.			Death-rate per 1,000.
		Male.	Female.	Not stated.	Total.		Both American.	Both Foreign.	Amer. Mother. For. Father	Amer. Father. For. Mother.	Both Foreign of diff. Nations.	Not stated.	Both American.	Both Foreign.	Husb. American. Wife Foreign.	Husb. Foreign. Wife American.	Not stated.	Total.			Male.	Female.	Not stated.	Total.	American.	Foreign.	Not stated.	
Hartford ...	234,123	3057	2881	13	5951	25.4	1961	3065	335	347	208	35	877	861	152	157	..	2047	377	380	1774	1497	..	3271	2268	956	47	13.9
New Haven	317,263	4570	4283	14	8867	27.9	2473	5010	590	497	266	31	1150	1039	153	199	..	2541	365	331	2633	2237	1	4871	3374	1446	51	15.3
New London	87,688	985	996	6	1987	22.6	821	801	150	144	60	11	407	225	38	42	..	712	141	121	737	729	..	1466	1064	369	33	16.7
Fairfield ...	211,529	2864	2750	8	5622	26.5	1926	2683	341	260	174	238	1029	692	105	161	..	1987	321	370	1876	1687	..	3563	2544	949	70	16.8
Windham ..	48,223	574	517	2	1093	22.6	459	359	133	117	18	7	215	71	30	46	..	362	67	72	370	376	1	747	549	186	12	15.4
Litchfield ..	71,779	811	769	5	1585	22.0	675	676	97	95	34	8	263	131	30	33	..	457	103	61	511	430	..	941	733	186	22	13.1
Middlesex ..	43,548	514	495	3	1012	23.2	371	485	60	55	39	2	144	114	13	18	..	289	73	43	393	369	..	762	549	201	12	17.4
Tolland	24,087	281	286	10	577	23.9	238	231	52	31	21	4	86	47	18	19	..	170	39	20	191	188	..	379	282	90	7	15.7
Total	1,038,240	13656	12977	61	26694	25.7	8924	13310	1758	1546	820	336	4171	3180	539	675	..	8565	1486	1398	8485	7513	2	16000	11363	4383	254	15.4

TABLE IV.

EXHIBITING THE NUMBER OF BIRTHS BY SEXES IN THE COUNTIES FOR EACH MONTH IN THE YEAR ENDING DECEMBER 31ST, 1908.

COUNTIES.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Mo. not sta.	Total.
Hartford	Males	254	256	281	243	273	250	263	247	252	261	212	265	..	3,057
	Females	231	242	248	239	230	230	262	255	248	208	247	241	..	2,881
	Not stated	----	3	1	2	2	----	----	----	1	2	1	1	..	13
		485	501	530	484	505	480	525	502	501	471	460	507	..	5,951
New Haven	Males	414	401	403	334	327	395	426	384	351	366	363	406	..	4,570
	Females	369	360	399	358	367	337	347	396	303	371	330	346	..	4,283
	Not stated	4	2	3	----	2	----	----	1	1	----	----	1	..	14
		787	763	805	692	696	732	773	781	655	737	693	753	..	8,867
New London	Males	77	66	97	73	81	81	80	105	84	86	78	77	..	985
	Females	86	87	101	88	90	82	85	83	57	83	80	74	..	996
	Not stated	----	----	1	----	----	1	1	----	1	1	1	----	..	6
		163	153	199	161	171	164	166	188	142	170	159	151	..	1,987
Fairfield	Males	245	216	264	226	238	227	277	230	249	232	209	251	..	2,864
	Females	250	235	234	227	220	215	243	267	237	193	212	217	..	2,750
	Not stated	----	1	1	----	1	2	1	1	----	----	----	1	..	8
		495	452	499	453	459	444	521	498	486	425	421	469	..	5,622
Windham	Males	45	50	47	45	52	42	50	53	47	49	51	43	..	574
	Females	35	46	50	47	38	47	50	43	38	47	28	48	..	517
	Not stated	----	----	----	----	1	----	----	1	----	----	----	----	..	2
		80	96	97	92	91	89	100	97	85	96	79	91	..	1,093
Litchfield	Males	58	71	67	73	81	67	60	70	79	61	63	61	..	811
	Females	53	58	67	92	74	75	63	64	69	48	61	45	..	769
	Not stated	----	----	----	1	1	----	1	----	----	1	----	1	..	5
		111	129	134	166	156	142	124	134	148	110	124	107	..	1,585
Middlesex	Males	48	45	46	48	35	44	46	40	47	33	39	43	..	514
	Females	54	50	47	43	57	45	30	32	33	39	36	29	..	495
	Not stated	----	----	2	----	----	----	----	----	----	----	1	----	..	3
		102	95	95	91	92	89	76	72	80	72	76	72	..	1,012
Tolland	Males	20	23	26	24	23	20	22	20	26	26	22	29	..	281
	Females	25	16	25	29	21	22	32	25	23	19	27	22	..	286
	Not stated	1	1	1	1	1	----	----	----	2	2	1	----	..	10
		46	40	52	54	45	42	54	45	51	47	50	51	..	577
Totals	Males	1161	1128	1231	1066	1110	1126	1224	1149	1135	1114	1037	1175	..	13,656
	Females	1103	1094	1171	1123	1097	1053	1112	1165	1008	1008	1021	1022	..	12,977
	Not stated	5	7	9	4	8	3	3	3	5	6	4	4	..	61
Grand Total	....	2269	2229	2411	2193	2215	2182	2339	2317	2148	2128	2062	2201	..	26,694

TABLE V.

EXHIBITING THE NUMBER OF DEATHS BY SEXES IN THE COUNTIES FOR EACH MONTH IN THE YEAR ENDING DECEMBER 31ST, 1908.

COUNTIES.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Mo. not sta.	Total.
Hartford	Males	174	164	183	142	134	119	150	153	147	126	140	140	2	1,774
	Females	157	128	144	127	95	94	131	145	116	118	115	127	--	1,497
	Not stated	----	----	----	----	----	----	----	----	----	----	----	----	--	------
		331	292	327	269	229	213	281	298	263	244	255	267	2	3,271
New Haven	Males	249	237	250	216	197	195	270	209	197	180	212	219	2	2,633
	Females	210	218	204	178	182	160	213	178	164	162	173	194	1	2,237
	Not stated	----	----	---	----	----	----	----	1	----	----	----	----	--	1
		459	455	454	394	379	355	483	388	361	342	385	413	3	4,871
New London	Males	56	66	72	66	55	63	64	74	61	53	41	65	1	737
	Females	68	83	68	71	59	46	53	67	57	62	49	46	--	729
	Not stated	----	----	----	----	----	----	----	----	----	----	----	----	--	------
		124	149	140	137	114	109	117	141	118	115	90	111	1	1,466
Fairfield	Males	184	182	143	151	150	146	191	172	141	142	133	141	--	1,876
	Females	179	180	139	142	132	125	176	152	125	117	111	109	--	1,687
	Not stated	----	----	----	----	----	----	----	----	----	----	----	----	--	------
		363	362	282	293	282	271	367	324	266	259	244	250	--	3,563
Windham	Males	41	32	29	28	23	20	36	31	28	44	25	33	--	370
	Females	41	50	36	35	20	18	30	31	27	38	20	30	--	376
	Not stated	----	----	----	----	----	----	----	----	----	----	1	----	--	1
		82	82	65	63	43	38	66	62	55	82	46	63	--	747
Litchfield	Males	41	42	58	37	29	49	36	46	48	41	30	54	--	511
	Females	40	33	44	36	35	34	36	42	35	35	22	38	--	430
	Not stated	----	----	----	----	----	----	----	----	----	----	----	----	--	------
		81	75	102	73	64	83	72	88	83	76	52	92	--	941
Middlesex	Males	46	35	26	33	35	23	44	28	39	39	18	26	1	393
	Females	33	22	26	33	30	35	37	39	29	30	27	28	--	369
	Not stated	----	----	----	----	----	----	----	----	----	----	----	----	--	------
		79	57	52	66	65	58	81	67	68	69	45	54	1	762
Tolland	Males	18	31	15	16	12	11	14	19	14	9	11	21	--	191
	Females	20	12	19	19	16	8	15	23	12	19	16	9	--	188
	Not stated	----	----	----	----	----	----	----	----	----	----	----	----	--	------
		38	43	34	35	28	19	29	42	26	28	27	30	--	379
Totals	Males	809	789	776	689	635	626	805	732	675	634	610	699	6	8,485
	Females	748	726	680	641	569	520	691	677	565	581	533	581	1	7,513
	Not stated	----	----	----	----	----	----	----	1	----	----	1	----	--	2
Grand Total	----------	1557	1515	1456	1330	1204	1146	1496	1410	1240	1215	1144	1280	7	16,000

TABLE VI.

NOSOLOGICAL ARRANGEMENT BY TOWNS—HARTFORD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Hartford.	Avon.	Berlin.	Bloomfield.	Bristol.	Burlington.	Canton.	East Granby.	East Hartford.	East Windsor.	Enfield.	Farmington.	Glastonbury.	Granby.	Hartland.	Manchester.	Marlborough.	New Britain.	Newington.	Plainville.	Rocky Hill.	Simsbury.	Southington.	South Windsor.	Suffield.	West Hartford.	Wethersfield.	Windsor.	Windsor Locks.	TOTAL.
Nomenclature of Statistics of Death.																																
CLASS I.—GENERAL DISEASES.																																
Typhoid Fever	M.	126	12				2		2		1			1	1	1				8					1							29
	F.	68	6				3													2					1	1		1		1		15
Fever, Intermittent	M.	2																														----
	F.	2																														----
a. Malaria	M.	13																		2												2
	F.	12																														----
b. Remittent Fever	M.	2																														----
	F.	5																														----
Measles	M.	46	8														1			1											2	12
	F.	42	6					1					1											1				1			1	11
Scarlatina	M.	32	7					3	1		2				1																	14
	F.	28	5															1														6
Whooping Cough	M.	39	1																	6		1								1		9
	F.	56	8													1				12												21
Diphtheria—Membranous Croup	M.	100	5				1		2		1		1							3												13
	F.	94	10				1	1			3		2			1				4				1			1					24
Grippe—Influenza	M.	177	6				1			1	1	1	2	1	3	1		1		3							1	1	1	2	1	27
	F.	219	13				3		2		4		3	1	1	1		3	1	6			2	1		2	2	1	1	1	1	49
Cholera, Nostras	M.	3													1					1												2
	F.	7																		1												1
Dysentery	M.	33	4												1					2					1		2			1		11
	F.	50	2								1		1		1			1		1					1		1			1		10

Erysipelas	M.	21	3																	2												5
	F.	21	1																	1					1							3
Other Epidemic Affections	F.	5										1								1												2
Purulent Infection and Septicæmia	M.	21	4		1															2												7
	F.	8	1																											1		2
a. Pyæmia	M.	10	2																	1												3
	F.	4	1																													1
Rabies	M.	1																														
Tubercle of Larynx	M.	8	1																													1
	F.	2																						1								1
Tubercle of Lungs	M.	802	86	1	3		8	3	2		5	2	5	1	1	2		7		28	1						3	1	5	1	1	166
	F.	589	45		1	2	5	1	1		2	2	5	2	1		1	6		15		2	1	3	3	1	2	2			1	104
Tubercle of Meninges	M.	52	5																	2		1							1			9
	F.	37	1												1			1				1										4
Tubercle, Abdominal	M.	30	2						1											4												7
	F.	21	3												1					2												6
Pott's Disease, Psoas Abscess	M.	5																		1												1
	F.	2																														
Abscess, Cold and by Congestion	M.	3																											1			1
White Tumors (White Swellings)	M.	5	1												1																	2
	F.	1																														
Tubercle of Other Organs	M.	10																				1										1
	F.	2					1																									1
Generalized Tubercle	M.	24	2				1				1																					4
	F.	16	3																													3
Scrofula	F.	2																														
Syphilis	M.	15	3																													3
	F.	12	2															1			1				1							5
Gonorrhœal Infections of Children	M.	1																														
Cancer and Other Malig. Tumors of Buc. Cavity	M.	1	1																													1
of Lips	M.	7	3									1												1								5
of Maxilla	M.	7	2																													2
	F.	5																														

TABLE VI—CONTINUED. HARTFORD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Hartford.	Avon.	Berlin.	Bloomfield.	Bristol.	Burlington.	Canton.	East Granby.	East Hartford.	East Windsor.	Enfield.	Farmington.	Glastonbury.	Granby.	Hartland.	Manchester.	Marlborough.	New Britain.	Newington.	Plainville.	Rocky Hill.	Simsbury.	Southington.	South Windsor.	Suffield.	West Hartford.	Wethersfield.	Windsor.	Windsor Locks.	TOTAL.
Cancer of Tongue	M.	8	2																													2
Cancer and Other Malignant Tumors of Stomach and Liver—	M.	2	1																													1
	F.	1																														
of Gall Bladder	M.	3																										1				1
	F.	4																														
of Liver	M.	32	5				1				1														1							8
	F.	38	4											1						2							1		1			9
Œsophagus	M.	2																		1												1
of Pancreas	M.	3	2																													2
	F.	5																														
of Pylorus	M.	2																														
	F.	1																														
of Stomach	M.	96	10									1			1			2		2	1						2			1	1	21
	F.	79	6			1					2									3				1	1	1		2				17
Cancer and Oth. Malig. Tum. of Perit'm, Intes. and Rect.—	M.	1	1																													1
	F.	4	1												1																	2
of Colon	M.	1																														
	F.	7																														
of Intestines	M.	20	5										1					1														7
	F.	34	3																			1				1		2				7
of Rectum	M.	10																														
	F.	22	1																	1					1				1			4

Cancer of Sigmoid Flexure	M.	1																														1
	F.	8	1																													
of Spleen	F.	1																														
of Peritoneum	F.	4																														
Can. and Other Malig. Tum. of the Female Genitals—																																
of Cervix	F.	6	2																													2
of Ovary	F.	8	1								1																					2
of Uterus	F.	118	10				1				1			1						2							2					17
of Vagina	F.	1																														
of Vulva	F.	1																														
Cancer and Other Malig. Tumors of the Breast	F.	88	8	1							1	1	1		1			1		1					1						1	17
Cancer and Other Malig. Tumors of the Skin—	M.	8																														
	F.	4	1																													1
of Face	M.	14											1							1												2
	F.	4																														
Cancer and Other Malignant Tumors of Other Organs and Organs not Specified—	M.	57	5				1	1				1	1							2									1			12
	F.	51	5				1						1		1										2		1					11
of Abdomen	M.	1																														
	F.	3				1																										1
of Bladder	M.	8																														
	F.	3	1																													1
of Lungs	M.	2																														
	F.	1																														
of Pelvis	M.	3																														
	F.	3																											1			1
of Penis	M.	1																														
of Testicle	M.	2																														
Other Tumors (Tum. of Female Genitals exc.)	M.	3	1																	1												2
	F.	2	1																													1
a. Abdominal	M.	2																														
	F.	8																														
b. Intestinal	M.	1																														

TABLE VI—CONTINUED. HARTFORD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Hartford.	Avon.	Berlin.	Bloomfield.	Bristol.	Burlington.	Canton.	East Granby.	East Hartford.	East Windsor.	Enfield.	Farmington.	Glastonbury.	Granby.	Hartland.	Manchester.	Marlborough.	New Britain.	Newington.	Plainville.	Rocky Hill.	Simsbury.	Southington.	South Windsor.	Suffield.	West Hartford.	Wethersfield.	Windsor.	Windsor Locks.	TOTAL.
Rheumatism, Acute, Articular	M.	36	4									1								1						1						7
	F.	49	3				1					1	1					3		5								1	1			16
Rheumatism, Chronic, and Gout	M.	13																		1							1					2
	F.	18									1		1																			2
Scorbutus	M.	1																		1												1
Diabetes	M.	72	6								1		3							3		1		1	2		1					18
	F.	104	6						1		2	1	2		1			2		2		1		2	1							21
Goiter, Exophthalmic	F.	7																														
Addison's Disease	M.	4																														
	F.	1	1																													1
Leukæmia	M.	2																														
	F.	1																														
a. Hodgkin's Disease	M.	4	1																	2												3
Anæmia, Chlorosis	M.	4												1						1												2
	F.	5	1																													1
a. Anæmia, Pernicious	M.	10	1																													1
	F.	24	2															1														3
Other General Diseases	M.	2																		1												1
	F.	2																														
Alcoholism, Acute and Chronic	M.	49	9															1							1							11
	F.	11	5																													5
a. Delirium Tremens	M.	10																														

Saturnism	M.	1																														
	F.	2		1																												1
Other Chronic Poisonings	M.	4										1																				1
	F.	4	1																													1
Total General Diseases		4133	382	2	6	4	31	10	12	1	31	14	32	9	19	7	2	32	1	144	3	9	3	12	19	7	20	13	14	10	9	858
CLASS II.—DISEASES OF THE NERVOUS SYSTEM AND ORGANS OF SPECIAL SENSE.																																
Encephalitis	F.	1																														
Meningitis, Simple	M.	94	3						1				2							5	1					1		1				14
	F.	80	4									1	1							1	1											8
a. Epidemic Cerebro-spinal Meningitis	M.	1	1																													1
b. Cerebro-spinal Meningitis	M.	23	4												1					1												6
	F.	33	4																						1							5
c. Lepto-Meningitis	M.	1	1																													1
	F.	2									1																					1
d. Spinal Meningitis	M.	14	1													1				1										1		4
	F.	14									1			1																		2
Locomotor Ataxia, Progressive	M.	23	2															1		1												4
	F.	4	1																													1
Other Diseases of the Spinal Cord	M.	13	3						1											1												5
	F.	16	2		1									1													1					5
a. Lateral Sclerosis	M.	7											1									1										2
	F.	5					1													1												2
b. Muscular Atrophy	F.	1																														
c. Paralysis Agitans	M.	10																							1							1
	F.	5	1																													1
Cerebral Congestion—Hemorrhage	M.	431	41	1	2		1	1	2	1	3	2	1	4			2	5	1	8		1		3	2	1	1	3	1	1	1	89
	F.	492	49		1	1	4		1		4	4	2	4	1	1		6		8	4	2	1	2	4	1	3	3	1	3		110
Cerebral Softening	M.	15	1				1																									2
	F.	17	1				1		1					1																		4

TABLE VI—CONTINUED. HARTFORD COUNTY—1908.

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Paralysis without Specified Cause	M.	43	2			1	1						1	1						2		1										9
	F.	38	3			1	1						1							2												8
a. Hemiplegia	M.	18	3																													3
	F.	13	2																													2
b. Paraplegia	F.	3	1																													1
Paralysis, General	M.	40	1																	1												2
	F.	18	1																													1
Other Forms of Mental Alienation	M.	10	2																													2
	F.	26	4										1																			5
Epilepsy	M.	25	2		1			2					1												1							7
	F.	34	1		1																				1		2					5
Eclampsia (non-puerperal) (5 years and over)	M.	1																														
	F.	7						1												1												2
Convulsions of Children (under 5)	M.	71	4				1						1		1					1											1	9
	F.	58	3				1				1		3							2							2			1	1	14
Tetanus	M.	8	1										1																			2
	F.	2	1																													1
a. Trismus Nascentium	M.	7																		1												1
	F.	2	1																													1
Chorea	F.	5	1																													1
Other Diseases of the Nervous System	M.	7																													1	1
	F.	13													1					1												2
a. Organic Brain Disease	M.	1																														

b. Cerebral Anæmia	F.	1																														
c. Cerebral Tumor	M.	16											1				1															2
	F.	10	2																													2
d. Labio-glosso-laryngeal Paralysis	M.	1																														
e. Neuralgia	F.	1																														
f. Neurasthenia	M.	1										1																				1
	F.	4																														
g. Multiple Neuritis	F.	1																														
Diseases of the Eye and its Adnexa	M.	1	1																													1
Diseases of the Ear—Otitis	M.	12	3								1																					4
	F.	7	1			1																										2
Total Diseases of Nervous System		1807	159	1	6	4	13	3	6	1	11	8	17	12	4	2	3	12	1	38	6	5	1	5	10	3	9	7	2	6	4	359
CLASS III.—DISEASES OF THE CIRCULATORY SYSTEM.																																
Pericarditis	M.	6																														
	F.	8																		1												1
Endocarditis, Acute	M.	63	8						1																1							10
	F.	73	7																	1					1			1				10
a. Myocarditis	M.	43	4																	2								2				8
	F.	40	9																	2												11
Organic Diseases of the Heart	M.	442	45			2	5	1	1		2	1	3		2			5		13				2	5		5	3	1	2		98
	F.	454	30		1		2	3	1		2		5		1			2		13	2			2	2			3		2		71
a. Cardiac Asthma	M.	1																														
	F.	1																														
b. Fatty Degeneration	M.	24	5										1		1			1		1		2										11
	F.	33	9												1					4												14
c. Valvular	M.	203	10		1		1	1	1		3				1			3				2				2			2		1	28
	F.	168	8				1	1			3				3			1		4						2					2	25
Angina Pectoris	M.	54	5						1						1																	7
	F.	32	1	1										1																		3

TABLE VI—CONTINUED. HARTFORD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Hartford.	Avon.	Berlin.	Bloomfield.	Bristol.	Burlington.	Canton.	East Granby.	East Hartford.	East Windsor.	Enfield.	Farmington.	Glastonbury.	Granby.	Hartland.	Manchester.	Marlborough.	New Britain.	Newington.	Plainville.	Rocky Hill.	Simsbury.	Southington.	South Windsor.	Suffield.	West Hartford.	Wethersfield.	Windsor.	Windsor Locks.	TOTAL.
Affec. of the Arteries (Atheroma, Aneurism, etc.)	M.	8	1																													1
	F.	13	4																													4
a. Aneurism of the Aorta	M.	2																														
	F.	1																														
b. Arterio-Sclerosis	M.	142	19	1					1				1	1				1		4					1		1				1	31
	F.	91	13						1	1				1				1		3								1		1		22
c. Atheroma of Coronary Arteries	M.	7																														
	F.	5																														
Embolus and Thrombosis (non-puerperal)	M.	29	2												1					1					1							5
	F.	38	1																													1
Aff. of Veins (Varices, Hemorrhoids, Phlebitis)	F.	5																														
Affec of the Lymp. Sys. (Lymphangitis, etc.)	M.	1																														
	F.	2																														
Hemorrhages	F.	2			1		1																									2
a. Purpura Hemorrhagica	M.	4																														
	F.	2																		1												1
Total of Circulatory System,		1997	181	2	3	2	10	6	7	1	10	1	10	3	11			14		50	2	4		4	11	4	6	10	3	5	4	364
CLASS IV.—DISEASES OF THE RESPIRATORY SYSTEM.																																
Affections of the Larynx	M.	3																														
	F.	1	1																													1
a. Laryngitis	M.	8	1										1							1												3
	F.	2																		1												1

b. Laryngismus Stridulus	M.	1																														
Affections of the Thyroid Body	F.	2	1																													1
Bronchitis, Acute	M.	88	10						1	1		1			1					3			1									18
	F.	71	7								1			1	4					1											1	16
a. Capillary	M.	26	1											1				1		1				1						2		7
	F.	22									1																					1
Bronchitis, Chronic	M.	66	2												3					2				1	1					1		10
	F.	74	7	1			2				1									2		1						3		1		18
Broncho-Pneumonia	M.	161	20				1		1						1		1			6	1										1	32
	F.	148	13	1		1				1	1	2		1						4								2		1		27
Pneumonia	M.	524	64		2		11				3		1		2			3		30	1	1		1		2	2	3		1	2	129
	F.	495	51		2		12		2		1	3	1	2	1	1		4		19	1	1		3			3	1	2	1	1	112
a. Pleuro-Pneumonia	M.	17														1								1	1							3
	F.	25	1				1							1									1									4
Pleurisy	M.	16	2																													2
	F.	17	2															1		1												4
Pulmonary Congestion and Apoplexy	M.	18	2																	3												5
	F.	30	1															1		1												3
Gangrene of the Lung	M.	1																		1												1
Asthma	M.	8	1				1													1												3
	F.	10																		1												1
Pulmonary Emphysema	M.	4	1																													1
	F.	3	1																	1												2
Other Dis. of Respiratory Appar. (Phthisis exc.)	M.	2																														
	F.	3												1																		1
a. Abscess of the Lung	M.	5	3		1																											4
	F.	4																														
b. Pulmonary Hemorrhage	M.	4																						1								1
	F.	4					1																									1
Total of Respiratory System		1858	192	2	5	1	29	..	4	2	8	6	3	7	12	2	1	10	..	79	3	3	2	8	2	2	5	9	2	7	5	411

TABLE VI—CONTINUED. HARTFORD COUNTY—1908.

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CLASS V.—DISEASES OF THE DIGESTIVE APPARATUS.																																
Affections of the Mouth and its Adnexa	M.	2																														
	F.	6																														
Affections of the Pharynx	M	4	1																	1												2
	F.	3	1																					1								2
a. Quinsy	M.	1																														
	F.	1																														
b. Tonsilitis	M.	4																														
	F.	3																														
Affections of the Œsophagus	M.	4	1																													1
	F.	2																														
Ulcer of the Stomach	M.	15																1							1							2
	F.	11	3				1																									4
Other Affect. of the Stomach (Cancer excepted)	M.	7																														
	F.	6	1																													1
a. Gastritis	M.	37										1								3							1			1		6
	F.	65	4		1										1					3				1								10
b. Gastric Catarrh	M.	2																														
	F.	1																														

c. Gastric Hemorrhage	M.	2																														
	F.	4																														
d. Indigestion	M.	49	1				1					1								2						1						6
	F.	53	4		1		2	1	1											1												10
Diarrhœa and Enteritis (under 2 years)	M.	39	6																									1				7
	F.	27	1																	1												2
a. Colitis	M.	6																														
	F.	5																														
b. Cholera Infantum	M.	197	4		1		5		1		1		5	1		1		2		16				1	1		1			2		42
	F.	200	4				5		2		1	3	5			1				17			1	2	1		1			2	1	46
c. Entero Colitis	M.	58	3				1						2	1																		7
	F.	47			1								3							3							1	1				9
d. Enteritis	M.	43	4										1					1		5												11
	F.	45	4				1						2							6					2							15
e. Gastro-Enteritis	M.	133	12									1	1					2		2					1			2				21
	F.	113	10				2								2					4										1		19
f. Diarrhœa	M.	39	2				1													1												4
	F.	37	7				1													2												10
Diarrhœa and Enteritis (2 yrs. and over)	M.	17	2				1																									3
	F.	17	2				1																		1					1		5
a. Colitis	M.	2																														
	F.	8													1																	1
b. Diarrhœa	M.	14	1											1																		2
	F.	27	1			1		1					1	1																		5
c. Enteritis	M.	8																														
	F.	17											1					1		1												3
d. Entero Colitis	M.	6	1																													1
	F.	10					1																									1
e. Gastro-Enteritis	M.	16																														
	F.	19	2																													2
Hernias: Intes. Obstructions—																																
a. Hernia	M.	21	2	1			1						1							3												8
	F.	26	2									1								1				1						1	1	7

TABLE VI—CONTINUED. HARTFORD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Hartford.	Avon.	Berlin.	Bloomfield.	Bristol.	Burlington.	Canton.	East Granby.	East Hartford.	East Windsor.	Enfield.	Farmington.	Glastonbury.	Granby.	Hartland.	Manchester.	Marlborough.	New Britain.	Newington.	Plainville.	Rocky Hill.	Simsbury.	Southington.	South Windsor.	Suffield.	West Hartford.	Wethersfield.	Windsor.	Windsor Locks.	TOTAL.
b. Volvulus	M.	3																		1												1
	F.	2																														
c. Intestinal Obstruction	M.	56	4				1												1	1					1					2		10
	F.	43	4		1		1						1					2				1								1		11
Other Affections of Intestines	M.	18	2				1							1						1												5
	F.	7	1																													1
a. Intestinal Hemorrhage	M.	1																														
	F.	3																														
Acute Yellow Atrophy of Liver	F.	3																														
Tumors, Hydatid, of the Liver	F.	2	1																													1
Cirrhosis of the Liver	M.	85	8			1	3					1	1					1		2		1	1	1				1			1	22
	F.	33	2				1									1				1		1										6
a. Hepatitis, interstitial or chronic	M.	2																														
	F.	6																1													1	2
b. Amyloid Degeneration of Liver	F.	1																														
c. Slow atrophy of Liver	M.	1																														
	F.	1	1																													1
Biliary Calculi	M.	4																										1				1
	F.	17	1				2																									3
Other Affections of the Liver	M.	17	2				1				1																				1	5
	F.	24	2										1			1				1					1							6
a. Abscess	M.	3	1				1																					1				3
	F.	3																		1												1
b. Tumor	F.	1																														

c. Hypertrophy	F.	1																														
d. Jaundice (3 mos. and over)	M.	8																														
	F.	4																														
e. Acute Hepatitis (3 mos. and over)	M.	3	2																													2
	F.	1																														
Affections of the Spleen	M.	2	2																													2
	F.	3	1																													1
Peritonitis, Simple (Puerperal excepted)	M.	10	2																													2
	F.	22	2														1		1					2								6
Oth. Affec. of Diges. Appar. (Canc. and Tub. ex.)	M.	3	1						1																							2
	F.	2	1																													1
Appendicitis and Abscess of the Iliac Fossa—																																
a. Appendicitis	M.	49	7				1	1				1		1						1							1			1		14
	F.	35	2				1													1						1	1					6
Total of Digestive System		1953	135	1	5	2	37	3	5		3	9	25	6	4	4		12	1	83		3	2	7	11	2	6	7		12	5	390
CLASS VI.—DISEASES OF THE GENITO-URINARY APPARATUS AND ITS ADNEXA.																																
Nephritis, Acute	M.	71	3				1					1			1			1						1								8
	F.	72	3				1					1	2		2					2												11
Bright's Disease	M.	482	59				1		1		2	1	3	1		1		3	1	6	1				3		1	1	1	3	1	90
	F.	370	45		1		2		1		4		1	1	2			4		5		1			3			2	1	1		74
a. Albuminuria	M.	2																		1												1
	F.	2																														
b. Uræmia	M.	21	1				1								1														1			4
	F.	18	3																	1							1	1				6
Other Diseases of the Kidneys and their Adnexa	M.	19	3																	1								1				5
	F.	10																														
a. Myoma and Abscess of Kidney	F.	2																														
b. Congestion, renal	M.	1																														

TABLE VI—CONTINUED. HARTFORD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Hartford.	Avon.	Berlin.	Bloomfield.	Bristol.	Burlington.	Canton.	East Granby.	East Hartford.	East Windsor.	Enfield.	Farmington.	Glastonbury.	Granby.	Hartland.	Manchester.	Marlborough.	New Britain.	Newington.	Plainville.	Rocky Hill.	Simsbury.	Southington.	South Windsor.	Suffield.	West Hartford.	Wethersfield.	Windsor.	Windsor Locks.	TOTAL.
Calculi of the Urinary Tract	M.	6	1				1																									2
	F.	1																														
Diseases of the Bladder	M.	5																														
	F.	3																														
a. Cystitis	M.	56	1									1	1					1				1	1				1					7
	F.	2																														
b. Retention of Urine	M.	3																														
Diseases of the Urethra	M.	3	1																													1
	F.	2																														
Diseases of the Prostate	M.	40	1														1			1												3
Non-venereal Diseases of Male Genital Organs	M.	1																														
Hemorrhage, Uterine (non-puerperal)	F.	1																														
Tumor, Uterine (non-cancerous)	F.	21	4				1																1									6
Other Diseases of the Uterus	F.	4																														
a. Pelvic Abscess	F.	6	1																													1
Cysts, and Other Tumors of the Ovary	F.	13	3																	1												4
Other Diseases of the Female Genital Organs	F.	4	1																													1
a. Pyosalpinx	F.	7	2																													2
b. Salpingitis	F.	3	1																													1
Non-puerperal Diseases of the Breast (Cancer ex.)	F.	2																														
Total Genito-Urinary System		1253	133	..	1	..	8	..	2	..	6	4	7	2	6	1	1	9	1	18	1	2	2	1	6	..	3	5	3	4	1	227

CLASS VII.—THE PUERPERAL STATE.																																
Accidents of Pregnancy	F.	21	2									1								1					1							5
a. Abortion	F.	4																														
b. Tubal Pregnancy	F.	2																														
Hemorrhage, Puerperal	F.	10									1																					1
Other Accidents of Labor	F.	5	1																													1
a. Dystocia	F.	2																														
b. Placenta Previa	F.	7								1																						1
Septicæmia, Puerperal	F.	32	4																													4
Albuminuria and Puerperal Eclampsia	F.	30	3											1						1												5
Other Puerperal Accidents	F	8																														
Total Diseases of the Puerperal State		121	10							1	1	1		1						2					1							17
CLASS VIII.—DISEASES OF THE SKIN AND CELLULAR TISSUE.																																
Gangrene	M.	25	4				1																									5
	F.	15	2																													2
Furuncle (Carbuncle)	M.	3																														
	F.	2																		1												1
Abscess	M.	5	2		1																											3
	F.	3																														
Other Diseases of Skin	M.	4	1																													1
	F.	10																		2								1				3
Total Dis. of Integumentary and Cellular Tissue		67	9		1		1													3								1				15

TABLE VI—CONTINUED. HARTFORD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Hartford.	Avon.	Berlin.	Bloomfield.	Bristol.	Burlington.	Canton.	East Granby.	East Hartford.	East Windsor.	Enfield.	Farmington.	Glastonbury.	Granby.	Hartland.	Manchester.	Marlborough.	New Britain.	Newington.	Plainville.	Rocky Hill.	Simsbury.	Southington.	South Windsor.	Suffield.	West Hartford.	Wethersfield.	Windsor.	Windsor Locks.	TOTAL.
CLASS IX.—DISEASES OF THE ORGANS OF LOCOMOTION.																																
Affections of the Bones (non-tuberculous)	F.	4																														
a. Abscess, Mastoid	M.	7	1																													1
	F.	5	1																													1
b. Rachitis	M.	9	1												1					1												3
	F.	5																														
c. Osteo-Myelitis	M.	3																														
Arthritis, Oth. Affec. of Jts. (Tub. and Rhm. ex.)	M.	3																1														1
Total Organs of Locomotion		36	3												1			1		1												6
CLASS X.—MALFORMATIONS.																																
Malformations, Congenital (Stillbirths excepted)	M.	47	4				2	1					3							1					1		1					13
	F.	56	5				2	1					2		1			1		5									1		1	19
a. Hydrocephalus	M.	13	1		1		2																									4
	F.	5	1																													1
b. Cyanosis	M.	7																		2												2
	F.	6	2			1																										3
c. Spina Bifida	M.	4	1																	1												2
	F.	5	1																												1	2
d. Open Foramen Ovale	M.	14	1										2																			3
	F.	7											1																			1
e. Imperforate Anus	M.	2																														
Total Malformations		166	16		1	1	6	2					8		1			1		9					1		1		1		2	50

CLASS XI.—EARLY INFANCY.																																
Congenital Debility	M.	102	18	..	..	..	..	..	..	..	..	..	1	..	..	..	..	2	..	6	..	..	..	..	..	..	..	..	1	1	1	25
	F.	70	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	1	2	..	..	..	..	..	1	16
a. Atelectasis	M.	17	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	3
	F.	16	2	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	1	..	..	..	..	6
b. Icterus Neonatorum	M.	21	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	..	..	..	..	..	..	..	..	..	..	..	7
	F.	7	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	2
c. Premature Birth	M.	270	22	..	..	1	4	3	..	..	..	..	3	..	..	..	1	5	..	14	2	..	1	1	1	..	..	..	..	2	1	61
	F.	203	23	..	..	..	5	..	..	..	..	1	2	1	2	..	..	3	..	13	..	..	..	..	..	..	..	..	..	2	1	53
Other Diseases of Early Infancy	M.	28	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	2	..	1	..	..	..	..	..	..	..	..	..	..	..	4
	F.	22	3	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	6
a. Umbilical Hemorrhage	M.	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1
	F.	5	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
Inanition under 3 months	M.	70	6	..	..	..	..	..	1	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	1	13
	F.	51	2	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	5
Total Early Infancy		888	84	..	1	1	10	3	1	..	..	2	13	2	2	..	1	13	..	45	2	..	1	2	4	..	2	1	1	6	7	204
CLASS XII.—OLD AGE.																																
Senile Debility	M.	124	5	..	..	..	..	..	..	..	4	..	..	..	..	..	..	2	..	2	..	..	..	..	3	..	..	1	..	1	..	18
	F.	180	14	..	..	..	1	1	..	..	3	..	1	..	1	..	1	..	..	5	..	..	1	..	2	..	2	5	..	2	..	39
Total Old Age		304	19	..	..	..	1	1	..	..	7	..	1	..	1	..	1	2	..	7	..	..	1	..	5	..	2	6	..	3	..	57
CLASS XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																																
Suicide by Poison	M.	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1
	F.	9	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1

TABLE VI—CONTINUED. HARTFORD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Hartford.	Avon.	Berlin.	Bloomfield.	Bristol.	Burlington.	Canton.	East Granby.	East Hartford.	East Windsor.	Enfield.	Farmington.	Glastonbury.	Granby.	Hartland.	Manchester.	Marlborough.	New Britain.	Newington.	Plainville.	Rocky Hill.	Simsbury.	Southington.	South Windsor.	Suffield.	West Hartford.	Wethersfield.	Windsor.	Windsor Locks.	TOTAL.
a. Narcotic Poison	M.	4	1																													1
	F.	2																														
b. Carbolic Acid	M.	42	3				1										1			3												8
	F.	17	3																	2												5
Suicide by Asphyxia	M.	1	1																													1
a. Inhalation of Illuminating Gas	M.	15	4																										1			5
	F.	4																										1				1
Suicide by Hanging or Strangulation	M.	11	1	1																1												3
	F.	6	1																													1
Suicide by Drowning	M.	10																						1				1				2
	F.	8					1																									1
Suicide by Firearms	M.	42	7	1																3										1		12
	F.	3	1																							1						2
Suicide by Cutting Instruments	M.	13	1																										1			2
Suicide by Jumping from high places	M.	2																														
Other Suicides	M.	3																								1						1
Total Suicides		198	24	2			2										1			10				1		2		2	2	1		47
Fractures, not specified—																																
a. Arms and Legs	M.	2	2																													2
b. Femur	M.	3	1																													1
	F.	3																														

c. Hip	M.	5																													
	F.	8	1																												1
d. Neck	M.	2																													
e. Ribs	M.	3	1										1																		2
f. Skull	M.	16	3				1													1											5
	F.	5	1																	1											2
g. Vertebra	M.	7																		1											1
	F.	1																													
Dislocations	M.	1																													
Other Accidental Traumatisms	M.	49	11										1							1										1	1	15
	F.	6								1																					1
a. Cerebral Concussion	M.	4																													
	F.	1																													
b. Fall	M.	79	11																	4											15
	F.	51	3						1			1														1				1		7
c. Fall from pole	M.	1	1																												1
d. Fall from window	M.	7	2				1													2											5
	F.	1																		1											1
e. Kick of Horse	M.	6																								1						1
f. Live Electric Wire	M.	1																													
g. Railway, Steam	M.	148	12		1		6			1		1						2		9		1	1		1							35
	F.	11																													
h. Railway, Street	M.	24	2								1	1		1				1		1												7
	F.	4																													
i. Automobile, Accidents	M.	13	2															1														3
	F.	4																		1											1
j. Injuries by Vehicle	M.	14	1		1															1								1				4
	F.	2																													
k. Gun Shot	M.	12																1														1

TABLE VI—Continued. Hartford County—1908.

CAUSES OF DEATH.		State.	Hartford.	Avon.	Berlin.	Bloomfield.	Bristol.	Burlington.	Canton.	East Granby.	East Hartford.	East Windsor.	Enfield.	Farmington.	Glastonbury.	Granby.	Hartland.	Manchester.	Marlborough.	New Britain.	Newington.	Plainville.	Rocky Hill.	Simsbury.	Southington.	South Windsor.	Suffield.	West Hartford.	Wethersfield.	Windsor.	Windsor Locks.	Total.
Burns and Scalds	M.	37	4	1							1																					6
	F.	47	6				1						1							2												10
Heat and Sunstroke	M.	13	2				1																									3
	F.	8																										2				2
Cold and Freezing	M.	5			1																											1
	F.	1																														
Electric Shock	M.	4	1								1																					2
a. Lightning	M.	4										1																				1
	F.	1																														
Accidental Drowning	M.	126	8		1				1									1					1						1	1	2	16
	F.	16	1																													1
Starvation and Privation	F.	1																														
Absorption of Deleterious Gases (Suicide ex.)	M.	19	3																													3
	F.	1	1																													1
Other Acute Poisonings	M.	28	1						1						1					1												4
	F.	22																		2		1										3
Other External Violence—																																
a. Suffocation	M.	15	1									1								1		1										4
	F.	7	1																	1												2
b. Injuries at birth	M.	80	11				1				2		1	1	1					5							1	2				25
	F.	40	2																	2					1							5

Capital Punishment—Execution	M.	3																											3			3
Homicides	M.	6																														
	F.	9	1																													1
a. Gunshot	M.	10	3																													3
	F.	6		1																												1
b. Stab or Cut	M.	6	1												1																	2
Total from Violence		1207	125	4	4		13		3	2	5	5	4	2	3		1	6		47		3	2	1	2	4	1	7	6	4	3	257
CLASS XIV.—ILL-DEFINED DISEASES.																																
Dropsy	M.	6	1				1													1												3
	F.	1																														
Inanition (over 3 months)	M.	9																1												1		2
	F.	9																		2												2
Marasmus (over 3 months)	M.	57	9		1				1				2							4				1			1					19
	F.	36											1							5							1					7
Ill-defined	M.	30					1		1																					1		3
	F.	19					1						1																	1		3
Causes unknown	M.	30	1					1												8	1	2							2			15
	F.	13																		2												2
Total Unspecified Causes		210	11		1		3	1	2				4					1		22	1	2		1			2		2	3		56
GRAND TOTAL		16000	1459	12	34	15	162	29	42	8	82	50	124	44	64	16	10	113	4	548	18	31	14	41	72	22	57	66	34	60	40	3271

TABLE VI—Continued.

NEW HAVEN COUNTY—1908.

CAUSES OF DEATH.		STATE.	New Haven.	Ansonia.	Beacon Falls.	Bethany.	Branford.	Cheshire.	Derby.	East Haven.	Guilford.	Hamden.	Madison.	Meriden.	Middlebury.	Milford.	Naugatuck.	North Branford.	North Haven.	Orange.	Oxford.	Prospect.	Seymour.	Southbury.	Wallingford.	Waterbury.	Wolcott.	Woodbridge.	TOTAL.
Nomenclature of Statistics of Death.																													
CLASS I.—GENERAL DISEASES.																													
Typhoid Fever	M.	126	32	1	--	--	--	--	1	--	--	1	--	1	--	--	--	--	--	3	--	--	--	--	--	7	--	--	46
	F.	68	12	--	--	--	--	1	1	--	1	--	--	4	--	--	1	--	--	1	--	--	--	--	--	5	--	--	26
Fever, Intermittent	M.	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
	F.	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	2
a. Malaria	M.	13	6	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8
	F.	12	1	--	--	--	--	--	--	--	--	--	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4
b. Remittent Fever	M.	2	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
	F.	5	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2
Measles	M.	46	7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	15	--	--	23
	F.	42	1	--	--	--	--	--	--	--	--	--	--	1	--	--	1	--	--	--	--	--	--	--	4	5	--	--	12
Scarlatina	M.	32	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	1	--	--	--	--	--	2	--	--	5
	F.	28	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	5
Whooping Cough	M.	39	6	--	--	--	--	--	--	--	--	--	--	2	--	1	--	--	--	--	--	--	--	--	--	5	--	--	14
	F.	56	9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	--	--	13
Diphtheria—Membranous Croup	M.	100	23	2	--	--	1	--	--	--	1	--	--	4	--	--	--	--	--	--	--	--	--	--	1	16	--	--	48
	F.	94	10	1	--	--	1	--	1	--	--	--	--	2	--	--	1	--	--	--	--	--	--	--	--	6	--	--	22
Grippe—Influenza	M.	177	23	3	--	1	2	1	--	1	--	--	--	9	--	3	1	--	--	2	--	--	1	--	--	11	--	1	59
	F.	219	11	2	--	--	1	--	3	--	1	3	2	15	--	3	1	--	--	5	--	--	3	1	1	8	--	--	60
Cholera, Nostras	M.	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
	F.	7	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	2
Dysentery	M.	33	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	--	3
	F.	50	9	2	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12

Erysipelas	M.	21	4												1										1	3			9
	F.	21	1				1		1					1			1						1		1	3			10
Other Epidemic Affections	F.	5																							3				3
Purulent Infection and Septicæmia	M.	21	4									1																	5
	F.	8	2						1																	1			4
a. Pyæmia	M.	10	1											1															2
	F.	4																											
Rabies	M.	1																											
Tubercle of Larynx	M.	8	1																						1				2
	F.	2																											
Tubercle of Lungs	M.	802	110	8	1		2	3	4		3	4	2	31		2	7			4	2	1	3	2	14	56			259
	F.	589	77	6	1		5		5	1	3	3		16		1	5	.1		5			3	1	4	46		1	184
Tubercle of Meninges	M.	52	8								1			1			1									3			14
	F.	37	6	1			1										1									6			15
Tubercle, Abdominal	M.	30	4	1										2												1			8
	F.	21	4											2												1			7
Pott's Disease, Psoas Abscess	M.	5		1										1															2
	F.	2																											
Abscess, Cold and by Congestion	M.	3												1															1
White Tumors (White Swellings)	M.	5																								1			1
	F.	1																											
Tubercle of Other Organs	M.	10	1											1												1			3
	F.	2																											
Generalized Tubercle	M.	24	6											2						1					2				11
	F.	16	2										1	2															5
Scrofula	F.	2																											
Syphilis	M.	15	3																										3
	F.	12	3																										3
Gonorrhœal Infections of Children	M.	1																											
Cancer and Other Malig. Tumors of Buc. Cavity	M.	1																											
of Lips	M.	7																											
of Maxilla	M.	7												1															1
	F.	5												1															1

TABLE VI.—CONTINUED. NEW HAVEN COUNTY—1908.

CAUSES OF DEATH.		STATE.	New Haven.	Ansonia.	Beacon Falls.	Bethany.	Branford.	Cheshire.	Derby.	East Haven.	Guilford.	Hamden.	Madison.	Meriden.	Middlebury.	Milford.	Naugatuck.	North Branford.	North Haven.	Orange.	Oxford.	Prospect.	Seymour.	Southbury.	Wallingford.	Waterbury.	Wolcott.	Woodbridge.	TOTAL.
Cancer of Tongue	M.	8	3																										3
Cancer and Other Malignant Tumors of Stomach and Liver—	M.	2																											
	F.	1																											
of Gall Bladder	M.	3	1																										1
	F.	4	2																							1			3
of Liver	M.	32	6																	1				1					8
	F.	38	5	1					1					2		1				1					1	1			13
Œsophagus	M.	2	1																										1
of Pancreas	M.	3	1																										1
	F.	5	2																										2
of Pylorus	M.	2																											
	F.	1																											
of Stomach	M.	96	27	1							1			1	1		3									5			39
	F.	79	9										1	1		1	2			1			1		1	1			18
Cancer and Oth. Malig. Tum. of Perit'm, Intes. and Rec.—	M.	1																											
	F.	4																											
of Colon	M.	1	1																										1
	F.	7	2																										2
of Intestines	M.	20	3											2												1			6
	F.	34	5											2												2			9
of Rectum	M.	10	3													1										2			6
	F.	22	4				1							1									1			1			8

Cancer of Sigmoid Flexure	M.	1																											
	F.	3	2																										2
of Spleen	F.	1	1																										1
of Peritoneum	F.	4																											
Can. and Other Malig. Tum. of the Female Genitals—																													
of Cervix	F.	6	1																										1
of Ovary	F.	8																							1				1
of Uterus	F.	118	13	1								2		4				2		3					1	10			36
of Vagina	F.	1		1																									1
of Vulva	F.	1																											
Cancer and Other Malig. Tumors of the Breast	F.	88	10				1					1	1	3										1	1	2			20
Cancer and other Malig. Tumors of the Skin—	M.	8	4																1										5
	F.	4	1														1												2
of Face	M.	14	1																							1			2
	F.	4	1																										1
Cancer and Other Malignant Tumors of Other Organs and Organs not Specified—	M.	57	12		1					1																7			21
	F.	51	8						1												1					3			13
of Abdomen	M.	1																											
	F.	3																											
of Bladder	M.	8					1													1									2
	F.	3	1																										1
of Lungs	M.	2																											
	F.	1																											
of Pelvis	M.	3							1																				1
	F.	3																											
of Penis	M.	1																											
of Testicle	M.	2					1																		1				2
Other Tumors (Tum. of Female Genitals exc.)	M	3	1																										1
	F.	2																											
a. Abdominal	M.	2	2																										2
	F.	8																				1							1
b. Intestinal	M.	1																											

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Rheumatism, Acute, Articular	M.	36	3				1	1	1					1		1			1	2					1	2			14
	F.	49	5																	2			1			4			12
Rheumatism, Chronic, and Gout	M.	13	2									1		1															4
	F.	18	3																							2			5
Scorbutus	M.	1																											
Diabetes	M.	72	3	1					1			1		2				1								2			11
	F.	104	17	2				1	2		2		1	2				1							3	7			38
Goiter, Exophthalmic	F.	7	1											1															2
Addison's Disease	M.	4	2																										2
	F.	1																											
Leukæmia	M.	2																											
	F.	1																											
a. Hodgkin's Disease	M.	4	1																										1
Anæmia, Chlorosis	M.	4																								1			1
	F.	5	3																										3
a. Anæmia, Pernicious	M.	10	2											1															3
	F.	24	2											2												1			5
Other General Diseases	M.	2																											
	F.	2																											
Alcoholism, Acute and Chronic	M.	49	3		1			1						2												7			14
	F.	11	3	1																						1			5
a. Delirium Tremens	M.	10	4																							1			5

Saturnism	M.	1															1												1
	F.	2																											
Other Chronic Poisonings	M.	4														1													1
	F.	4																											
Total General Diseases		4133	582	37	4	1	19	8	24	3	13	18	9	135	2	15	27	5	2	33	3	2	14	7	44	274	2	2	1285
CLASS II.—DISEASES OF THE NERVOUS SYSTEM AND ORGANS OF SPECIAL SENSE.																													
Encephalitis	F.	1																											
Meningitis, Simple	M.	94	14				1		1					3				1							3	15	1		39
	F.	80	10	2			1		1					3			5			1					1	6			30
a. Epidemic Cerebro-spinal Meningitis	M.	1																											
b. Cerebro-spinal Meningitis	M.	23	6				1					1																	8
	F.	33	6				1													1	1					2			11
c. Lepto-Meningitis	M.	1																											
	F.	2	1																										1
d. Spinal Meningitis	M.	14		3																					1				4
	F.	14		1							1					1									1	2			6
Locomotor Ataxia, Progressive	M.	23	2								1																		3
	F.	4																											
Other Diseases of the Spinal Cord	M.	13	2	1															1							1			5
	F.	16	5																										5
a. Lateral Sclerosis	M.	7		1																									1
	F.	5							1																				1
b. Muscular Atrophy	F.	1																											
c. Paralysis Agitans	M.	10	3												1														4
	F.	5	2																										2
Cerebral Congestion—Hemorrhage	M.	431	35	1			2	2	3	1		2	2	16		1	2	1	2	6	3				4	15	1		99
	F.	492	53	4			2	2	2	1	1	2	2	13	1	3	6		1	4			1		2	29	2	1	132
Cerebral Softening	M.	15																		1					1				2
	F.	17	1								1														1	1			4

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CAUSES OF DEATH.		STATE.	New Haven.	Ansonia.	Beacon Falls.	Bethany.	Branford.	Cheshire.	Derby.	East Haven.	Guilford.	Hamden.	Madison.	Meriden.	Middlebury.	Milford.	Naugatuck.	North Branford.	North Haven.	Orange.	Oxford.	Prospect.	Seymour.	Southbury.	Wallingford.	Waterbury.	Wolcott.	Woodbridge.	TOTAL.
Paralysis without Specified Cause	M.	43	1	1												1							2						5
	F.	38	2	3					1					2		1			1				1			2			13
a. Hemiplegia	M.	18	2											2						1				1					6
	F.	13	4						1					1													1		7
b. Paraplegia	F.	3																											
Paralysis, General	M.	40	2											1															3
	F.	18	1																										1
Other Forms of Mental Alienation	M.	10	1																										1
	F.	26	3											1											1				5
Epilepsy	M.	25	2											1						1									4
	F.	34	1																							2			3
Eclampsia (non-puerperal) (5 years and over)	M.	1																											
	F.	7	2																			1							3
Convulsions of Children (under 5)	M.	71	12		1		1		3					1									1			4			23
	F.	58	5						1	2				3			3								1	1			16
Tetanus	M.	8	2																							1			3
	F.	2																											
a. Trismus Nascentium	M.	7					1																						1
	F.	2	1																										1
Chorea	F.	5	1	1																									2
Other Diseases of the Nervous System	M.	7	1																	1									2
	F.	13	2				1																1			2			6
a. Organic Brain Disease	M.	1																											

b. Cerebral Anæmia	F.	1																											
c. Cerebral Tumor	M.	16	3																							3			6
	F.	10	2											1												1			4
d. Labio-glosso-laryngeal Paralysis	M.	1																											
e. Neuralgia	F.	1																											
f. Neurasthenia	M.	1																											
	F.	4																											
g. Multiple Neuritis	F.	1												1															1
Diseases of the Eye and its Adnexa	M.	1																											
Diseases of the Ear—Otitis	M.	12	2																							1			3
	F.	7	2	1																									3
Total Diseases of the Nervous System		1807	194	19	1	..	11	4	14	4	4	5	4	49	2	7	16	2	5	16	4	1	6	1	16	88	5	1	479
CLASS III.—DISEASES OF THE CIRCULATORY SYSTEM.																													
Pericarditis	M.	6	1																										1
	F.	8	2											1															3
Endocarditis, Acute	M.	63	1				1									1				1						2			6
	F.	73	11											1	1	1				1						5			20
a. Myocarditis	M.	43	3						2	1				2		1								1		2			12
	F.	40	3							1				1												6			11
Organic Diseases of the Heart	M.	442	55	4			3	1	2		3	1	1	11		1	2	1	4	3	1		2		4	15		1	115
	F.	454	94	8			1		3	2	1	2		8		5	2		2	5					3	17			153
a. Cardiac Asthma	M.	1																											
	F.	1																											
b. Fatty Degeneration	M.	24	3			1																				3			7
	F.	33	1						1												1				1	1			5
c. Valvular	M.	203	17	1		1	2	2	3		1	1		5			2	1	1	1			1		3	11	1	1	55
	F.	168	20				3		1					9		1									1	8			43
Angina Pectoris	M.	54	6			1		1			1			2		1										3			15
	F.	32	5											1		1										1			8

TABLE VI—CONTINUED. NEW HAVEN COUNTY—1908.

CAUSES OF DEATH.		STATE.	New Haven.	Ansonia.	Beacon Falls.	Bethany.	Branford.	Cheshire.	Derby.	East Haven.	Guilford.	Hamden.	Madison.	Meriden.	Middlebury.	Milford.	Naugatuck.	North Branford.	North Haven.	Orange.	Oxford.	Prospect.	Seymour.	Southbury.	Wallingford.	Waterbury.	Wolcott.	Woodbridge.	TOTAL.
Affec. of the Arteries(Atheroma, Aneurism, etc.)	M.	8												1											1	1			3
	F.	13																											
a. Aneurism of the Aorta	M.	2	1																										1
	F.	1																											
b. Arterio-Sclerosis	M.	142	25	2					1					3			2	3						1		5			42
	F.	91	10	2			1	1	1			1		3			2		1							3			25
c. Atheroma of Coronary Arteries	M.	7	2																										2
	F.	5																											
Embolus and Thrombosis (non-puerperal)	M.	29	3																							3			6
	F.	38	7	1										1			1									4			14
Aff. of Veins (Varices, Hemorrhoids, Phlebitis)	F.	5	1																										1
Affec. of the Lymp. Sys. (Lymphangitis, etc.)	M.	1																											
	F.	2	1																										1
Hemorrhages	F.	2																											
a. Purpura Hemorrhagica	M.	4	1																										1
	F.	2	1																										1
Total of Circulatory System		1997	274	18	..	3	11	5	14	4	6	5	1	49	1	12	11	5	8	11	2	..	3	2	13	90	1	2	551
CLASS IV.—DISEASES OF THE RESPIRATORY SYSTEM.																													
Affections of the Larynx	M.	3																											
	F.	1																											
a. Laryngitis	M.	8												1															1
	F.	2																											

b. Laryngismus Stridulus	M.	1																											
Affections of the Thyroid Body	F.	2																											
Bronchitis, Acute	M.	83	14	3					2					2											2	7			30
	F.	71	8	3			1		1					2									1			12			28
a. Capillary	M.	26	1	4			1																						6
	F.	22	1	1					2		1																		5
Bronchitis, Chronic	M.	66	10				1					1		2			2									3			19
	F.	74	7	1									1			1	1	1		2						6		1	21
Broncho-Pneumonia	M.	161	35				1		1		2			3			2						1		2	18			65
	F.	148	23	1	1		1		1			1		7		2	3	1		2			2	1	1	17			64
Pneumonia	M.	524	83	6		1	2		4	1		1		20		3	4		1	2			2		5	40			175
	F.	495	70	9		1		1	7	1		3		16		1	4		1	6			2	1		25		1	149
a. Pleuro-Pneumonia	M.	17	1		1									1												2			5
	F.	25	1																				1			4			6
Pleurisy	M.	16	1	1										1															3
	F.	17	2																				1			2			5
Pulmonary Congestion and Apoplexy	M.	18	1																							1			2
	F.	30	5						2			1		3												3			14
Gangrene of the Lung	M.	1																											
Asthma	M.	8																								2			2
	F.	10	1						2					1												1			5
Pulmonary Emphysema	M.	4																											
	F.	3																											
Other Dis. of Respiratory Appar. (Phthisis exc.)	M.	2																								2			2
	F.	3		2																									2
a. Abscess of the Lung	M.	5																											
	F.	4	1	1				1																		1			4
b. Pulmonary Hemorrhage	M.	4	1																										1
	F.	4																											
Total of Respiratory System		1858	266	32	2	2	7	2	22	2	3	7	1	59	..	7	16	2	2	12	..	..	10	2	10	146	..	2	614

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CLASS V.—DISEASES OF THE DIGESTIVE APPARATUS.																													
Affections of the Mouth and its Adnexa	M.	2																								1			1
	F.	6	1																										1
Affections of the Pharynx	M.	4	1																										1
	F.	3																								1			1
a. Quinsy	M.	1					1																						1
	F.	1																											
b. Tonsilitis	M.	4	1															1								1			3
	F.	3																											
Affections of the Œsophagus	M.	4	1																										1
	F.	2		1																									1
Ulcer of the Stomach	M.	15	3											1		1	1									1		1	8
	F.	11	1																										1
Other Affect. of the Stomach (Cancer excepted)	M.	7					1																			1			2
	F.	6												2															2
a. Gastritis	M.	37	4											1						1					1	3			10
	F.	65	9	1										1						1			1			6	1		20
b. Gastric Catarrh	M.	2																											
	F.	1																											

c. Gastric Hemorrhage	M.	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	2
	F.	4	1	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2
d. Indigestion	M.	49	7	2	--	--	--	--	--	--	--	--	1	2	--	--	2	--	--	--	--	--	1	--	--	1	--	--	16
	F.	58	3	--	--	--	--	--	--	--	--	1	--	3	--	--	1	--	--	1	--	--	--	--	--	2	1	--	12
Diarrhœa and Enteritis (under 2 years)	M.	39	3	--	--	--	--	--	1	--	--	1	--	2	--	--	2	--	--	1	--	--	--	--	--	4	1	--	15
	F.	27	--	1	--	--	--	--	2	--	--	1	1	1	--	--	--	--	--	--	--	--	--	--	--	3	--	--	9
a. Colitis	M.	6	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	3
	F.	5	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
b. Cholera Infantum	M.	197	12	8	--	--	1	--	6	--	--	1	--	8	--	2	3	--	1	2	--	--	--	--	--	17	--	--	61
	F.	200	17	3	--	2	1	--	1	--	1	1	--	6	--	--	1	--	--	--	--	--	2	--	2	14	--	--	51
c. Entero Colitis	M.	58	15	--	--	--	2	--	1	--	--	1	--	4	--	--	--	--	--	--	--	--	1	--	--	4	--	--	28
	F.	47	8	1	--	--	1	--	--	--	--	1	--	2	--	--	--	--	--	1	--	--	1	--	--	6	--	--	21
d. Enteritis	M.	43	3	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	1	--	--	--	--	--	8	1	--	14
	F.	45	4	--	--	--	--	--	--	--	--	1	--	--	--	--	1	--	--	--	--	--	--	--	--	5	--	--	11
e. Gastro-Enteritis	M.	133	12	11	--	--	--	--	--	--	--	--	--	4	--	--	--	--	--	1	--	--	2	--	1	21	1	--	53
	F.	113	14	4	--	--	--	--	--	--	--	--	--	3	--	--	--	--	--	1	--	--	--	--	1	11	--	--	34
f. Diarrhœa	M.	39	16	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	2	2	--	--	21
	F.	37	8	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	3	2	--	--	14
Diarrhœa and Enteritis (2 years and over)	M.	17	2	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	--	--	--	--	--	1	--	--	--	5
	F.	17	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	4
a. Colitis	M.	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	F.	8	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2
b. Diarrhœa	M.	14	4	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5
	F.	27	2	--	--	--	--	1	1	--	--	--	2	--	--	1	--	--	--	--	--	--	--	--	--	1	--	--	8
c. Enteritis	M.	8	2	1	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4
	F.	17	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	3
d. Entero Colitis	M.	6	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
	F.	10	2	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3
e. Gastro-Enteritis	M.	16	2	--	--	--	--	--	--	--	--	--	--	1	--	1	1	--	--	--	--	--	--	--	--	3	--	--	8
	F.	19	6	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	1	--	--	--	--	--	--	2	--	--	11
Hernias: Intestinal Obstructions—																													
a. Hernia	M.	21	1	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	1	--	--	4	--	--	7
	F.	26	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6

TABLE VI—CONTINUED. NEW HAVEN COUNTY—1908.

CAUSES OF DEATH.		STATE.	New Haven.	Ansonia.	Beacon Falls.	Bethany.	Branford.	Cheshire.	Derby.	East Haven.	Guilford.	Hamden.	Madison.	Meriden.	Middlebury.	Milford.	Naugatuck.	North Branford.	North Haven.	Orange.	Oxford.	Prospect.	Seymour.	Southbury.	Wallingford.	Waterbury.	Wolcott.	Woodbridge.	TOTAL.
b. Volvulus	M.	3																								1			1
	F.	2												1															1
c. Intestinal Obstruction	M.	56	4	1													1			1					2	6			15
	F.	43	5	1				1																		5			12
Other Affections of Intestines	M.	18		1										2												1			4
	F.	7		1										1				1	1										4
a. Intestinal Hemorrhage	M.	1																					1						1
	F.	3																											
Acute Yellow Atrophy of Liver	F.	3																		1						1			2
Tumors, Hydatid, of the Liver	F.	2	1																										1
Cirrhosis of the Liver	M.	85	7	2							1		1	1												6			18
	F.	33	4	1										2												3			10
a. Hepatitis, interstitial or chronic	M.	2																											
	F.	6									1															1			2
b. Amyloid Degeneration of Liver	F.	1		1																									1
c. Slow atrophy of Liver	M.	1																											
	F.	1																											
Biliary Calculi	M.	4														1										1			2
	F.	17	1					1						1						1					1	1			6
Other Affections of the Liver	M.	17	2											1							1								4
	F.	24	1	2										2												1			6
a. Abscess	M.	3																											
	F.	3																								1			1
b. Tumor	F.	1																											

c. Hypertrophy	F.	1																											
d. Jaundice (3 mos. and over)	M.	3																											
	F.	4	1																										
e. Acute Hepatitis (3 mos. and over)	M.	3																											1
	F.	1																											
Affections of the Spleen	M.	2																											
	F.	3																											
Peritonitis, Simple (Puerperal excepted)	M.	10	1	1																									2
	F.	22	3									1														1			5
Oth. Affec. of Diges. Appar. (Canc. and Tub. ex.)	M.	3		1																									1
	F.	2																											
Appendicitis and Abscess of the Iliac Fossa—																													
a. Appendicitis	M.	49	6											1			1			1						7			16
	F.	35	7											2			1								1	2			13
Total of Digestive System		1953	219	47		2	8	4	14		3	11	5	60	1	7	16	2	4	14	1		11		15	166	5	2	617
CLASS VI.—DISEASES OF THE GENITO-URINARY APPARATUS AND ITS ADNEXA.																													
Nephritis, Acute	M.	71	14	1					1								1						1		1	8			27
	F.	72	8	1					2			1		2		1									1	7			23
Bright's Disease	M.	482	74	2	1		3	1	1		1	2	1	11		5	3	1	1		1		3		6	29			146
	F.	370	38	3					2		1	1		5		3	1		1				3	1	1	20			80
a. Albuminuria	M.	2																											
	F.	2											1																1
b. Uræmia	M.	21	5	1										1															7
	F.	18	3																							2			5
Other Diseases of the Kidneys and their Adnexa	M.	19	1																										1
	F.	10	2																1				1						4
a. Myoma and Abscess of Kidney	F.	2																											
b. Congestion, renal	M.	1																											

TABLE VI—CONTINUED. NEW HAVEN COUNTY—1908.

CAUSES OF DEATH.		STATE.	New Haven.	Ansonia.	Beacon Falls.	Bethany.	Branford.	Cheshire.	Derby.	East Haven.	Guilford.	Hamden.	Madison.	Meriden.	Middlebury.	Milford.	Naugatuck.	North Branford.	North Haven.	Orange.	Oxford.	Prospect.	Seymour.	Southbury.	Wallingford.	Waterbury.	Wolcott.	Woodbridge.	TOTAL.
Calculi of the Urinary Tract	M.	6	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
	F.	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Diseases of the Bladder	M.	5	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	2
	F.	3	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
a. Cystitis	M.	56	11	1	..	..	1	..	1	..	1	..	..	2	..	1	..	..	..	1	..	..	..	..	..	2	..	..	21
	F.	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
b. Retention of Urine	M.	3	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
Diseases of the Urethra	M.	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
	F.	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Diseases of the Prostate	M.	40	13	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	1	..	..	17
Non-venereal Diseases of Male Gen. Organs	M.	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Hemorrhage, Uterine (non-puerperal)	F.	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Tumor, Uterine (non-cancerous)	F.	21	4	..	..	..	..	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	3	..	..	10
Other Diseases of the Uterus	F.	4	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
a. Pelvic Abscess	F.	6	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	3
Cysts, and other Tumors of the Ovary	F.	13	2	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	4
Other Diseases of the Female Genital Organs	F.	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1
a. Pyosalpinx	F.	7	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
b. Salpingitis	F.	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Non-puerperal Diseases of the Breast (Cancer ex.)	F.	2	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Total Genito-Urinary System		1253	188	11	1	..	4	1	7	2	3	5	2	23	..	10	7	1	3	1	1	..	9	1	10	74	..	..	364

CLASS VII.—THE PUERPERAL STATE.																													
Accidents of Pregnancy	F.	21	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	5
a. Abortion	F.	4	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	8
b. Tubal Pregnancy	F.	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	1
Hemorrhage, Puerperal	F.	10	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	3
Other Accidents of Labor	F.	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	1
a. Dystocia	F.	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
b. Placenta Previa	F.	7	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Septicæmia, Puerperal	F.	32	2	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	1	--	1	2	--	--	8
Albuminuria and Puerperal Eclampsia	F.	30	3	3	--	--	--	1	--	--	--	--	1	1	--	--	1	--	--	--	--	--	--	--	--	4	--	--	14
Other Puerperal Accidents	F.	8	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2
Total Diseases of the Puerperal State		121	10	5	--	--	--	1	1	--	1	--	1	2	1	--	1	--	--	--	--	--	1	--	1	13	--	--	38
CLASS VIII.—DISEASES OF THE SKIN AND CELLULAR TISSUE.																													
Gangrene	M.	25	3	--	--	--	--	--	--	--	--	--	--	1	--	--	1	--	--	--	--	--	--	--	--	--	--	--	5
	F.	15	5	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	6
Furuncle (Carbuncle)	M.	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	1
	F.	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
Abscess	M.	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
	F.	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	1
Other Diseases of Skin	M.	4	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	3
	F.	10	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	3
Total Dis. of Integumentary and Cellular Tissue		67	12	--	--	--	--	--	--	--	--	--	--	1	--	1	1	--	--	--	--	--	--	--	1	3	--	--	19

TABLE VI—CONTINUED. NEW HAVEN COUNTY—1908.

CAUSES OF DEATH.		STATE.	New Haven.	Ansonia.	Beacon Falls.	Bethany.	Branford.	Cheshire.	Derby.	East Haven.	Guilford.	Hamden.	Madison.	Meriden.	Middlebury.	Milford.	Naugatuck.	North Branford.	North Haven.	Orange.	Oxford.	Prospect.	Seymour.	Southbury.	Wallingford.	Waterbury.	Wolcott.	Woodbridge.	TOTAL.
CLASS IX.—DISEASES OF THE ORGANS OF LOCOMOTION.																													
Affections of the Bones (non-tuberculous)	F.	4	1								1																		2
a. Abscess, Mastoid	M.	7	2											1												1			4
	F.	5	3																							1			4
b. Rachitis	M.	9	1																						1	1			3
	F.	5	1																						1				2
c. Osteo-Myelitis	M.	3	2																										2
Arthritis, Oth. Affec. of Jts. (Tub. and Rhm. ex.)	M.	3																											
Total Organs of Locomotion		36	10								1			1											2	3			17
CLASS X.—MALFORMATIONS.																													
Malformations, Congenital (Stillbirths excepted)	M.	47	3	1										1										1		3			9
	F.	56	2	2										2		1	1										1		9
a. Hydrocephalus	M.	13												1															1
	F.	5	1																										1
b. Cyanosis	M.	7	1																										1
	F.	6	1					1																					2
c. Spina Bifida	M.	4														1													1
	F.	5																											
d. Open Foramen Ovale	M.	14	2			1	2					1													1				7
	F.	7														1				1									2
e. Imperforate Anus	M.	2																											
Total Malformations		166	10	3		1	2	1				1		4		3	1			1				1	1	3	1		33

CLASS XI.—EARLY INFANCY.																													
Congenital Debility	M.	102	15	5			1		3					7						1			1	1		7			41
	F.	70	13	1					1					6			1									6			28
a. Atelectasis	M.	17	3					1																		2			6
	F.	16	3																							8			6
b. Icterus Neonatorum	M.	21	1																							3			4
	F.	7																											
c. Premature Birth	M.	270	34	9	1		1		1		1	2	1	3		1	6		1	3					4	30			98
	F.	203	25	1					4			2		6	1		1						2		4	22			68
Other Diseases of Early Infancy	M.	28	8	1																					1				10
	F.	22	6						1																				7
a. Umbilical Hemorrhage	M.	6		1																						1			2
	F.	5										1											1						2
Inanition under 3 months	M.	70	6	4				1			1			4			2			1						6			25
	F.	51	1				1		1		1	1					2			1					2	1			11
Total Early Infancy		888	115	22	1		3	2	11		3	6	1	26	1	1	12		1	6			4	1	11	81			308
CLASS XII.—OLD AGE.																													
Senile Debility	M.	124	23	2				1						2		1			2	1						5			37
	F.	180	27	1			3	1			1			9						1						12		1	56
Total Old Age		304	50	3			3	2			1			11		1			2	2						17		1	93
CLASS XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																													
Suicide by Poison	M.	6												1															1
	F.	9					1																						1

TABLE VI—CONTINUED. NEW HAVEN COUNTY—1908.

CAUSES OF DEATH.		STATE.	New Haven.	Ansonia.	Beacon Falls.	Bethany.	Branford.	Cheshire.	Derby.	East Haven.	Guilford.	Hamden.	Madison.	Meriden.	Middlebury.	Milford.	Naugatuck.	North Branford.	North Haven.	Orange.	Oxford.	Prospect.	Seymour.	Southbury.	Wallingford.	Waterbury.	Wolcott.	Woodbridge.	TOTAL.
a. Narcotic Poison	M.	4																											
	F.	2																											
b. Carbolic Acid	M.	42	8						2			1		2					1				1		2	5			22
	F.	17	5																							2			7
Suicide by Asphyxia	M.	1																											
a. Inhalation of Illuminating Gas	M.	15	5																										5
	F.	4																											
Suicide by Hanging or Strangulation	M.	11	1											1												1			3
	F.	6					1							1															2
Suicide by Drowning	M.	10	2																	1					1	1			5
	F.	8																		1									1
Suicide by Firearms	M.	42	3	1					1			1				1				2					2	3			14
	F.	3																											
Suicide by Cutting Instruments	M.	13	3											1															4
Suicide by Jumping from high places	M.	2	2																										2
Other Suicides	M.	3																											
Total Suicides		198	29	1			2		3			2		6		1			1	4			1		5	12			67
Fractures, not specified—																													
a. Arms and Legs	M.	2																											
b. Femur	M.	3	1																							1			2
	F.	3	1																									1	2

c. Hip	M.	5	1											2															3
	F.	8	1								1															1			3
d. Neck	M.	2																								1			1
e. Ribs	M.	3																											
f. Skull	M.	16	3											1												1			5
	F.	5	1																							1			2
g. Vertebra	M.	7	1														1												2
	F.	1															1												1
Dislocations	M.	1																											
Other Accidental Traumatisms	M.	49	5	1							1					2	2	1		1				1	1	4			19
	F.	6	1																							1			2
a. Cerebral Concussion	M.	4																											
	F.	1																											
b. Fall	M.	79	11							1		1		1		2			1				1		1	6			25
	F.	51	7				2				1	1					1			1					1	2			16
c. Fall from pole	M.	1																											
d. Fall from window	M.	7															1												1
	F.	1																											
e. Kick of Horse	M.	6	1																										1
f. Live Electric Wire	M.	1																											
g. Railway, Steam	M.	148	14	1	1		2			1				2		2	1			4						9			37
	F.	11	1		1														2										4
h. Railway, Street	M.	24	4											1												4			9
	F.	4	2																										2
i. Automobile, Accidents	M.	13	5																							3			8
	F.	4																											
j. Injuries by Vehicle	M.	14	1																							2			3
	F.	2																						1					1
k. Gun Shot	M.	12	1														1												2

TABLE VI—CONTINUED. NEW HAVEN COUNTY—1908.

CAUSES OF DEATH.		STATE.	New Haven.	Ansonia.	Beacon Falls.	Bethany.	Branford.	Cheshire.	Derby.	East Haven.	Guilford.	Hamden.	Madison.	Meriden.	Middlebury.	Milford.	Naugatuck.	North Branford.	North Haven.	Orange.	Oxford.	Prospect.	Seymour.	Southbury.	Wallingford.	Waterbury.	Wolcott.	Woodbridge.	TOTAL.
Burns and Scalds	M.	37	6				1			1															1				9
	F.	47	6	1							1					1	2									3			14
Heat and Sunstroke	M.	13										1													1	1			3
	F.	8																		1					1	2			4
Cold and Freezing	M.	5																											
	F.	1																											
Electric Shock	M.	4																											
a. Lightning	M.	4																											
	F.	1																							1				1
Accidental Drowning	M.	126	7	1	1	1	2		3	1	1			1	3	2	2			3						4			32
	F.	16	1		1		1									1				1									5
Starvation and Privation	F.	1																								1			1
Absorption of Deleterious Gases (Suicide ex.)	M.	19	4	1																						6			11
	F.	1																											
Other Acute Poisonings	M.	28										1		2			1								2	4			10
	F.	22	5																						1	2			8
Other External Violence—																													
a. Suffocation	M.	15	1				1																		2				4
	F.	7	1																							1			2
b. Injuries at birth	M.	80	9						2					3		1	1									9			25
	F.	40	6						1										1						1	4			13

Capital Punishment—Execution	M.	3																											
Homicides	M.	6														1										1			2
	F.	9	2																				1						3
a. Gunshot	M.	10	3																							1			4
	F.	6	1						1																	1			3
b. Stab or Cut	M.	6	1																							1			2
Total from Violence		1207	144	6	4	1	11	..	10	4	5	6	..	19	3	13	14	1	5	15	..	..	3	2	18	89	..	1	374
Class XIV.—Ill-defined Diseases.																													
Dropsy	M.	6	1																										1
	F.	1																											
Inanition (over 3 months)	M.	9	1					1																		1			3
	F.	9	1																							1			2
Marasmus (over 3 months)	M.	57	7						1					1									1			3			13
	F.	36	6						1											1			1		2	2			13
Ill-defined	M.	30	21	1																1				1					24
	F.	19	10															1											11
Causes unknown	M.	30		6																						1			7
	F.	13		2			1																		1	1			5
Total Unspecified Causes		210	47	9	..	..	1	1	2	..	..	..	..	1	..	..	...	1	..	2	..	..	2	1	3	9	..	..	79
Grand Total		16000	2121	212	13	10	80	31	119	19	43	64	24	440	11	77	122	19	32	113	11	3	63	18	145	1056	14	11	4871

TABLE VI—Continued.

NEW LONDON COUNTY—1908.

CAUSES OF DEATH.		STATE.	New London.	Bozrah.	Colchester.	East Lyme.	Franklin.	Griswold.	Groton.	Lebanon.	Ledyard.	Lisbon.	Lyme.	Montville.	Norwich.	No. Stonington.	Old Lyme.	Preston.	Salem.	Sprague.	Stonington.	Voluntown.	Waterford.	TOTAL.
Nomenclature of Statistics of Death.																								
CLASS I.—GENERAL DISEASES.																								
Typhoid Fever	M.	126	1						1				1	1	5									9
	F.	68	1						1															2
Fever, Intermittent	M.	2																						
	F.	2																						
a. Malaria	M.	13																						
	F.	12													1									1
b. Remittent Fever	M.	2																						
	F.	5																						
Measles	M.	46	1												1	1					1			4
	F.	42														1				2	1			4
Scarlatina	M.	32	3					1	1						1						1			7
	F.	28	1					2																3
Whooping Cough	M.	39																						
	F.	56																						
Diphtheria—Membranous Croup	M.	100													1					1	1			3
	F.	94																		1	2		1	4
Grippe—Influenza	M.	177	4						1	1		1		1	4	3		1					1	17
	F.	219	2			1		1	1			1		1	12			2			2			23
Cholera, Nostras	M.	3																						
	F.	7																						
Dysentery	M.	33													3						1			4
	F.	50				1									3						1			5

Erysipelas	M.	21																					
	F.	21												1									1
Other Epidemic Affections	F.	5																					
Purulent Infection and Septicæmia	M.	21										1			1								2
	F.	8						1															1
a. Pyæmia	M.	10																					
	F.	4	1																				1
Rabies	M.	1																					
Tubercle of Larynx	M.	8																			1		1
	F.	2																					
Tubercle of Lungs	M.	802	14		4		2	2	4		2	2	1	1	16	1	1	2		2	5	1	2	62
	F.	589	8	1			1	1	6		1				22			4		4	4		1	53
Tubercle of Meninges	M.	52	1												2									3
	F.	37						2							1									3
Tubercle, Abdominal	M.	30							1						3									4
	F.	21													1						1			2
Pott's Disease, Psoas Abscess	M.	5																						
	F.	2																						
Abscess, Cold and by Congestion	M.	3																						
White Tumors (White Swellings)	M.	5							1															1
	F.	1																						
Tubercle of Other Organs	M.	10	1																					1
	F.	2																						
Generalized Tubercle	M.	24												1		1								2
	F.	16																1						1
Scrofula	F.	2																			1			1
Syphilis	M.	15	1												2									3
	F.	12																1						1
Gonorrhœal Infections of Children	M.	1																						
Cancer and Other Malig. Tumors of Buc. Cavity	M.	1																						
of Lips	M.	7																						
of Maxilla	M.	7													1						1			2
	F.	5																						

TABLE VI—CONTINUED. NEW LONDON COUNTY—1908.

CAUSES OF DEATH.		STATE.	New London.	Bozrah.	Colchester.	East Lyme.	Franklin.	Griswold.	Groton.	Lebanon.	Ledyard.	Lisbon.	Lyme.	Montville.	Norwich.	No. Stonington.	Old Lyme.	Preston.	Salem.	Sprague.	Stonington.	Voluntown.	Waterford.	TOTAL.
Cancer of Tongue	M.	8																					1	1
Cancer and Other Malignant Tumors of Stomach and Liver—	M.	2																						
	F.	1													1									1
of Gall Bladder	M.	3																						
	F.	4			1																			1
of Liver	M.	32	3		1																			4
	F.	38	1				1			1														3
Œsophagus	M.	2																						
of Pancreas	M.	3																						
	F.	5	1																					1
of Pylorus	M.	2																						
	F.	1																						
of Stomach	M.	96	1			1									2									4
	F.	79	2					1							2	1								6
Cancer and Oth. Malig. Tum. of Perit'm, Intes. and Rect.—	M.	1																						
	F.	4																						
of Colon	M.	1																						
	F.	7			1																			1
of Intestines	M.	20																						
	F.	34	2												1									3
of Rectum	M.	10																						
	F.	22	1												3									4

Cancer of Sigmoid Flexure	M.	1																						
	F.	3																						
of Spleen	F.	1																						
of Peritoneum	F.	4	1																					1
Can. and Other Malig. Tum of the Female Genitals—																								
of Cervix	F.	6																						
of Ovary	F.	8	1																					1
of Uterus	F.	118	1			1			1						5	1	1				1			11
of Vagina	F.	1																						
of Vulva	F.	1	1																					1
Cancer and Other Malig. Tumors of the Breast	F.	88	3	1					1		1	1		1	4		1							13
Cancer and Other Malig. Tumors of the Skin	M.	8												1										1
	F.	4																						
of Face	M.	14	1													1								2
	F.	4																						
Cancer and Other Malignant Tumors of Other Organs and Organs not Specified—	M.	57	2										1		2									5
	F.	51	1											1	2									4
of Abdomen	M.	1																						
	F.	3	1																					1
of Bladder	M.	8							1															1
	F.	3																						
of Lungs	M.	2							1															1
	F.	1																						
of Pelvis	M.	3																						
	F.	3																						
of Penis	M.	1																						
of Testicle	M.	2																						
Other Tumors (Tum. of Female Genitals exc.)	M.	3																						
	F.	2																						
a. Abdominal	M.	2																						
	F.	8				1			1						1									3
b. Intestinal	M.	1																						

TABLE VI—CONTINUED. NEW LONDON COUNTY—1908.

CAUSES OF DEATH.		STATE.	New London.	Bozrah.	Colchester.	East Lyme.	Franklin.	Griswold.	Groton.	Lebanon.	Ledyard.	Lisbon.	Lyme.	Montville.	Norwich.	No. Stonington.	Old Lyme.	Preston.	Salem.	Sprague.	Stonington.	Voluntown.	Waterford.	TOTAL.
Rheumatism, Acute, Articular	M.	36	1											1									1	3
	F.	49	1												1						1		1	4
Rheumatism, Chronic, and Gout	M.	13						1							1	1							1	4
	F.	18	2												1									3
Scorbutus	M.	1																						
Diabetes	M.	72	2			1		1						2										6
	F.	104	1					2	2						2						2			9
Goiter, Exophthalmic	F.	7	1												1									2
Addison's Disease	M.	4																						
	F.	1																						
Leukæmia	M.	2													1									1
	F.	1	1																					1
a. Hodgkin's Disease	M.	4																						
Anæmia Chlorosis	M.	4																						
	F.	5	1																					1
a. Anæmia, Pernicious	M.	10	1						1															2
	F.	24	1						1						1									3
Other General Diseases	M.	2																						
	F.	2																						
Alcoholism, Acute and Chronic	M.	49	2		1					1					1						1			6
	F.	11																						
a. Delirium Tremens	M.	10																						

Saturnism	M.	1																						
	F.	2																						
Other Chronic Poisonings	M.	4														1								1
	F.	4																		1				1
Total General Diseases		4133	76	2	8	6	4	15	26	3	4	6	3	10	114	10	5	11	..	10	28	2	9	352
CLASS II.—DISEASES OF THE NERVOUS SYSTEM AND ORGANS OF SPECIAL SENSE.																								
Encephalitis	F.	1													1									1
Meningitis, Simple	M.	94	2	1	1			1							4					1				10
	F.	80	1					1	1				1		8					1				13
a. Epidemic Cerebro-spinal Meningitis	M.	1																						
b. Cerebro-spinal Meningitis	M.	23	1												1									2
	F.	33	1						1															2
c. Lepto-Meningitis	M.	1																						
	F.	2																						
d. Spinal Meningitis	M.	14																					1	1
	F.	14																						
Locomotor Ataxia, Progressive	M.	23	2					1							2									5
	F.	4	1							1														2
Other Diseases of the Spinal Cord	M.	13																						
	F.	16	1						1					1	1									4
a. Lateral Sclerosis	M.	7									1							1						2
	F.	5																						
b. Muscular Atrophy	F.	1																						
c. Paralysis Agitans	M.	10																						
	F.	5																						
Cerebral Congestion—Hemorrhage	M.	431	7	1	1		1	4	4			1	2	3	9	2	2	4	1	1	5		2	50
	F.	492	13		3	2		3	5	3	1			3	16		1		1	1	4	1	4	61
Cerebral Softening	M.	15							1	1					1									3
	F.	17	1												1									2

TABLE VI—CONTINUED. NEW LONDON COUNTY—1908.

CAUSES OF DEATH.		STATE.	New London.	Bozrah.	Colchester.	East Lyme.	Franklin.	Griswold.	Groton.	Lebanon.	Ledyard.	Lisbon.	Lyme.	Montville.	Norwich.	No. Stonington.	Old Lyme.	Preston.	Salem.	Sprague.	Stonington.	Voluntown.	Waterford.	TOTAL.
Paralysis without Specified Cause	M.	43	1					1	2		1									1				6
	F.	38	1										1		2			1						5
a. Hemiplegia	M.	18	1								1													2
	F.	13													2									2
b. Paraplegia	F.	3																						
Paralysis, General	M.	40	1												1			3						5
	F.	18													1			1						2
Other Forms of Mental Alienation	M.	10																						
	F.	26							1	1														2
Epilepsy	M.	25													2			1			1			4
	F.	34								1				1										2
Eclampsia (non-puerperal) (5 years and over)	M.	1						1																1
	F.	7																			1			1
Convulsions of Children (under 5)	M.	71	3					1							2						2			8
	F.	58	1												1									2
Tetanus	M.	8																						
	F.	2													1									1
a. Trismus Nascentium	M.	7																						
	F.	2																						
Chorea	F.	5																						
Other Diseases of the Nervous System	M.	7	1						1															2
	F.	13	1																					1
a. Organic Brain Disease	M.	1																						

b. Cerebral Anæmia	F.	1																						
c. Cerebral Tumor	M.	16																			1		1	2
	F.	10	2														1							3
d. Labio-glosso-laryngeal Paralysis	M.	1																						
e. Neuralgia	F.	1													1									1
f. Neurasthenia	M.	1																						
	F.	4																						
g. Multiple Neuritis	F.	1																						
Diseases of the Eye and its Adnexa	M.	1																						
Diseases of the Ear—Otitis	M.	12	1											1										2
	F.	7																						
Total Diseases of Nervous System		1807	43	2	5	2	1	13	17	7	4	1	4	9	57	2	3	12	2	5	14	1	8	212
CLASS III.—DISEASES OF THE CIRCULATORY SYSTEM.																								
Pericarditis	M.	6																						
	F.	8																						
Endocarditis, Acute	M.	63							1						1								1	3
	F.	78	1																					1
a. Myocarditis	M.	43	1												2						1	1		5
	F.	40	2																					2
Organic Diseases of the Heart	M.	442	8			2		2	7		2			1	16	1		3	1	1	5			49
	F.	454	12		1	3			3		1			1	16		1	3		1	6	1		49
a. Cardiac Asthma	M.	1																						
	F.	1													1									1
b. Fatty Degeneration	M.	24						1																1
	F.	33	1														1							2
c. Valvular	M.	203	1		1	1	2	1	2					2	6	3		1			1		2	23
	F.	168	3					1	2	1					9	1					3			20
Angina Pectoris	M.	54	3	1	1										2		1							8
	F.	32	1					1					1		3						1			7

TABLE VI—Continued. New London County—1908.

CAUSES OF DEATH.		State.	New London.	Bozrah.	Colchester.	East Lyme.	Franklin.	Griswold.	Groton.	Lebanon.	Ledyard.	Lisbon.	Lyme.	Montville.	Norwich.	No. Stonington.	Old Lyme.	Preston.	Salem.	Sprague.	Stonington.	Voluntown.	Waterford.	Total.
Affec. of the Arteries (Atheroma, Aneurism, etc.)	M.	8																			1			1
	F.	13	1																					1
a. Aneurism of the Aorta	M.	2																						
	F.	1																						
b. Arterio-Sclerosis	M.	142	3	1					2					1	3		1	1						12
	F.	91	2		1										3			1						7
c. Atheroma of Coronary Arteries	M.	7																						
	F.	5																						
Embolus and Thrombosis (non-puerperal)	M.	29	1						1															2
	F.	38				1								1	2									4
Aff. of Veins (Varices, Hemorrhoids, Phlebitis)	F.	5																						
Affec. of the Lymp. Sys. (Lymphangitis, etc.)	M.	1																						
	F.	2																						
Hemorrhages	F.	2																						
a. Purpura Hemorrhagica	M.	4																						
	F.	2																						
Total of Circulatory System		1997	40	2	4	7	2	6	18	1	3	...	1	6	64	5	4	9	1	2	18	2	3	198
Class IV.—Diseases of the Respiratory System.																								
Affections of the Larynx	M.	3																						
	F.	1																						
a. Laryngitis	M.	8													1									1
	F.	2																						

b. Laryngismus Stridulus	M.	1																						
Affections of the Thyroid Body	F.	2							1															1
Bronchitis, Acute	M.	83						1							1						1			3
	F.	71													2						2			4
a. Capillary	M.	26				1			1					1										3
	F.	22													1					1				2
Bronchitis, Chronic	M.	66	2			1		2							2						1			8
	F.	74	3		1		1	1	1						2	1								10
Broncho-Pneumonia	M.	161	1	1				1	2			1			4			1		1	1	1		14
	F.	148	3					1	1						4						1			10
Pneumonia	M.	524	5		1			2	3	2	1			1	12			1		2	4		2	36
	F.	495	11		8	2		3	1						10						4		1	40
a. Pleuro-Pneumonia	M.	17													1						2			3
	F.	25							1						1						1		1	4
Pleurisy	M.	16	1					1		1					1						1			5
	F.	17	1																					1
Pulmonary Congestion and Apoplexy	M.	18						1						1										2
	F.	30							1															1
Gangrene of the Lung	M	1																						
Asthma	M.	8																						
	F.	10																						
Pulmonary Emphysema	M.	4																						
	F.	3																						
Other Dis. of Respiratory Appar. (Phthisis exc.)	M.	2																						
	F.	3																						
a. Abscess of the Lung	M.	5																						
	F.	4																						
b. Pulmonary Hemorrhage	M.	4																						
	F.	4																						
Total of Respiratory System		1858	27	1	10	4	1	13	12	3	1	1	...	3	42	1	..	2	..	4	18	1	4	148

TABLE VI—CONTINUED. NEW LONDON COUNTY—1908.

CAUSES OF DEATH.		STATE.	New London.	Bozrah.	Colchester.	East Lyme.	Franklin.	Griswold.	Groton.	Lebanon.	Ledyard.	Lisbon.	Lyme.	Montville.	Norwich.	No. Stonington.	Old Lyme.	Preston.	Salem.	Sprague.	Stonington.	Voluntown.	Waterford.	TOTAL.
CLASS V.—DISEASES OF THE DIGESTIVE APPARATUS.																								
Affections of the Mouth and its Adnexa	M.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	6	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	3
Affections of the Pharynx	M.	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
a. Quinsy	M.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
b. Tonsilitis	M.	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	3	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2
Affections of the Œsophagus	M.	4	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1
	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ulcer of the Stomach	M.	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	11	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Other Affect. of the Stomach (Cancer excepted)	M.	7	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
	F.	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
a. Gastritis	M.	37	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	3
	F.	65	1	...	...	...	...	...	...	1	...	...	...	...	4	...	...	...	...	...	...	...	...	6
b. Gastric Catarrh	M.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	2
	F.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

c. Gastric Hemorrhage	M.	2																						
	F.	4	1																					1
d. Indigestion	M.	49							1						3					2				6
	F.	53	2									1			5									8
Diarrhœa and Enteritis (under 2 years)	M.	39	1																		1			2
	F.	27													1									1
a. Colitis	M.	6												1										1
	F.	5	1												1									2
b. Cholera Infantum	M.	197	2		1				1			1			1					1	4			11
	F.	200	5						2	1					9					1	1			19
c. Entero Colitis	M.	58	3						2					1	1						2			9
	F.	47	1			1								1							1			4
d. Enteritis	M.	43													2									2
	F.	45	2												2						1			5
e. Gastro-Enteritis	M.	133	2			1															1		1	5
	F.	113	5					1											1		1			8
f. Diarrhœa	M.	39	1												1						1	1		4
	F.	37	2												1									3
Diarrhœa and Enteritis (2 yrs. and over)	M.	17														1								1
	F.	17			1				1												1			3
a. Colitis	M.	2																						
	F.	8																						
b. Diarrhœa	M.	14																						
	F.	27	1						1						2									4
c. Enteritis	M.	8																						
	F.	17																2						2
d. Entero Colitis	M.	6	1																					1
	F.	10				1									1									2
e. Gastro-Enteritis	M.	16	1												1									2
	F.	19										1												1
Hernias: Intestinal Obstructions—																								
a. Hernia	M.	21													1									1
	F.	26													2									2

TABLE VI—CONTINUED. NEW LONDON COUNTY—1908.

CAUSES OF DEATH.		STATE.	New London.	Bozrah.	Colchester.	East Lyme.	Franklin.	Griswold.	Groton.	Lebanon.	Ledyard.	Lisbon.	Lyme.	Montville.	Norwich.	No. Stonington.	Old Lyme.	Preston.	Salem.	Sprague.	Stonington.	Voluntown.	Waterford.	TOTAL.
b. Volvulus	M.	3																						
	F.	2																						
c. Intestinal Obstruction	M.	56													2									2
	F.	43	3						1						2									6
Other Affections of Intestines	M.	18													1					1				2
	F.	7																						
a. Intestinal Hemorrhage	M.	1																						
	F.	3													1									1
Acute Yellow Atrophy of the Liver	F.	3																						
Tumors, Hydatid, of Liver	F.	2																						
Cirrhosis of the Liver	M.	85	1												3			1			1	1		7
	F.	33																						
a. Hepatitis, interstitial or chronic	M.	2	1																					1
	F.	6																					1	1
b. Amyloid Degeneration of Liver	F.	1																						
c. Slow atrophy of Liver	M.	1																						
	F.	1																						
Biliary Calculi	M.	4																						
	F.	17																			1			1
Other Affections of the Liver	M.	17																1						1
	F.	24																						
a. Abscess	M.	3																						
	F.	3																						
b. Tumor	F.	1																						

c. Hypertrophy	F.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
d. Jaundice (3 mos. and over)	M.	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	4	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...
e. Acute Hepatitis (3 mos. and over)	M.	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Affections of the Spleen	M.	2	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...
	F.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Peritonitis, Simple (Puerperal excepted)	M.	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	22	1	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	1	...	...	...	4
Oth. Affec. of Diges. Appar. (Canc. and Tub. ex.)	M.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Appendicitis and Abscess of the Iliac Fossa—																								
a. Appendicitis	M.	49	...	...	...	...	...	...	...	...	...	...	1	...	2	...	...	...	...	...	...	...	...	3
	F.	35	1	...	...	...	...	...	...	1	...	...	1	...	1	...	...	...	...	...	...	...	...	4
Total of Digestive System		1953	40	...	2	3	1	3	10	3	2	3	2	4	58	1	..	4	1	6	17	3	3	166
CLASS VI.—DISEASES OF THE GENITO-URINARY APPARATUS AND ITS ADNEXA.																								
Nephritis, Acute	M.	71	1	...	...	...	...	...	...	...	...	...	...	1	2	1	...	...	...	2	...	...	...	7
	F.	72	2	...	...	...	...	1	...	...	...	...	...	...	3	1	...	...	...	...	1	...	...	8
Bright's Disease	M.	482	9	1	2	...	...	1	8	1	...	1	...	1	18	1	1	2	...	...	6	...	2	54
	F.	370	10	1	1	4	2	1	6	1	...	...	...	2	7	1	...	4	...	...	2	...	2	44
a. Albuminuria	M.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
b. Uræmia	M.	21	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	2
	F.	18	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Other Diseases of the Kidneys and their Adnexa	M.	19	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	2	1	1	...	6
	F.	10	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
a. Myoma and Abscess of Kidney	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
b. Congestion, renal	M.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1

TABLE VI—CONTINUED. NEW LONDON COUNTY—1908.

CAUSES OF DEATH.		STATE.	New London.	Bozrah.	Colchester.	East Lyme.	Franklin.	Griswold.	Groton.	Lebanon.	Ledyard.	Lisbon.	Lyme.	Montville.	Norwich.	No. Stonington.	Old Lyme.	Preston.	Salem.	Sprague.	Stonington.	Voluntown.	Waterford.	TOTAL.
Calculi of the Urinary Tract	M.	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Diseases of the Bladder	M.	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
a. Cystitis	M.	56	1	...	1	...	...	...	...	...	...	1	...	1	3	...	...	...	...	...	1	...	1	9
	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
b. Retention of Urine	M.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Diseases of the Urethra	M.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Diseases of the Prostate	M.	40	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	2
Non-venereal Diseases of Male Genital Organs	M.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hemorrhage, Uterine (non-puerperal)	F.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1
Tumor, Uterine (non-cancerous)	F.	21	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	3
Other Diseases of the Uterus	F.	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
a. Pelvic Abscess	F.	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cysts, and Other Tumors of the Ovary	F.	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1
Other Diseases of the Female Genital Organs	F.	4	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1
a. Pyosalpinx	F.	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
b. Salpingitis	F.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Non-puerperal Diseases of the Breast (Cancer ex.)	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total Genito-Urinary System		1253	27	2	4	4	2	3	14	2	...	2	...	5	40	4	3	6	..	4	13	1	5	141

CLASS VII.—THE PUERPERAL STATE.																								
Accidents of Pregnancy	F.	21																						
a. Abortion	F.	4																						
b. Tubal Pregnancy	F.	2																						
Hemorrhage, Puerperal	F.	10																			1			1
Other Accidents of Labor	F.	5													1									1
a. Dystocia	F.	2																						
b. Placenta Previa	F.	7																						
Septicæmia, Puerperal	F.	32	2												1								1	4
Albuminuria and Puerperal Eclampsia	F.	30						1																1
Other Puerperal Accidents	F.	8	2												1									3
Total Diseases of the Puerperal State		121	4					1							3						1		1	10
CLASS VIII.—DISEASES OF THE SKIN AND CELLULAR TISSUE.																								
Gangrene	M.	25							2															2
	F.	15																						
Furuncle (Carbuncle)	M.	3																						
	F.	2															1							1
Abscess	M.	5													1									1
	F.	3																						
Other Diseases of Skin	M.	4																						
	F.	10																						
Total Dis. of Integumentary and Cellular Tissue		67							2						1		1							4

TABLE VI—CONTINUED. NEW LONDON COUNTY—1908.

CAUSES OF DEATH.		STATE.	New London.	Bozrah.	Colchester.	East Lyme.	Franklin.	Griswold.	Groton.	Lebanon.	Ledyard.	Lisbon.	Lyme.	Montville.	Norwich.	No. Stonington.	Old Lyme.	Preston.	Salem.	Sprague.	Stonington.	Voluntown.	Waterford.	TOTAL.
CLASS IX.—DISEASES OF THE ORGANS OF LOCOMOTION.																								
Affections of the Bones (non-tuberculous)	F.	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
a. Abscess, Mastoid	M.	7	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
b. Rachitis	M.	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
c. Osteo-Myelitis	M.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Arthritis, Oth. Affec. of Jts. (Tub. and Rhm. ex.)	M.	3	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Total Organs of Locomotion		36	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
CLASS X.—MALFORMATIONS.																								
Malformations, Congenital (Stillbirths excepted)	M.	47	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	56	1	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4
a. Hydrocephalus	M.	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
b. Cyanosis	M.	7	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1
	F.	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
c. Spina Bifida	M.	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
d. Open Foramen Ovale	M.	14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
e. Imperforate Anus	M.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total Malformations		166	1	...	...	...	...	3	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	6

CLASS XI.—EARLY INFANCY.																								
Congenital Debility	M.	102						1							1									2
	F.	70	1																		4		1	6
a. Atelectasis	M.	17	1												1									2
	F.	16																						
b. Icterus Neonatorum	M.	21																					1	1
	F.	7	1																					1
c. Premature Birth	M.	270	7			2									6					1	1		1	18
	F.	203	3					2							8					2	3			18
Other Diseases of Early Infancy	M.	28							1						1									2
	F.	22							1															1
a. Umbilical Hemorrhage	M.	6																						
	F.	5																						
Inanition under 3 months	M.	70	2												1									3
	F.	51							2						1									3
Total Early Infancy		888	15			2		3	4						19					3	8		3	57
CLASS XII.—OLD AGE.																								
Senile Debility	M.	124	2		1				3						5						2			13
	F.	180	2		3				4			1		2	4						7			23
Total Old Age		304	4		4				7			1		2	9						9			36
CLASS XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																								
Suicide by Poison	M.	6	2		1																			3
	F.	9				1									1									2

TABLE VI—CONTINUED. NEW LONDON COUNTY—1908.

CAUSES OF DEATH.		STATE.	New London.	Bozrah.	Colchester.	East Lyme.	Franklin.	Griswold.	Groton.	Lebanon.	Ledyard.	Lisbon.	Lyme.	Montville.	Norwich.	No. Stonington.	Old Lyme.	Preston.	Salem.	Sprague.	Stonington.	Voluntown.	Waterford.	TOTAL.
a. Narcotic Poison	M.	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
b. Carbolic Acid	M.	42	2	...	1	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	5
	F.	17	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Suicide by Asphyxia	M.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
a. Inhalation of Illuminating Gas	M.	15	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Suicide by Hanging or Strangulation	M.	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1
Suicide by Drowning	M.	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	8	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1
Suicide by Firearms	M.	42	3	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	5
	F.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Suicide by Cutting Instruments	M.	13	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Suicide by Jumping from high places	M.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Other Suicides	M.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1
Total Suicides		198	8	...	2	1	...	...	...	...	1	1	...	1	3	...	...	1	...	...	...	1	...	19
Fractures, not specified—																								
a. Arms and Legs	M.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
b. Femur	M.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

c. Hip	M.	5																						
	F.	8							1															1
d. Neck	M.	2																						
e. Ribs	M.	3																						
f. Skull	M.	16	1																					1
	F.	5																						
g. Vertebra	M.	7	1																					1
	F.	1																						
Dislocations	M.	1																						
Other Accidental Traumatisms	M.	49	1												1									2
	F.	6																						
a. Cerebral Concussion	M.	4																						
	F.	1																						
b. Fall	M.	79	2					1	1	2					2									8
	F.	51	2			1		1	1						4						2			11
c. Fall from pole	M.	1																						
d. Fall from window	M.	7													1									1
	F.	1																						
e. Kick of Horse	M.	6													1									1
f. Live Electric Wire	M.	1																						
g. Railway, Steam	M.	148	4			1			2			1			2									10
	F.	11	2																		1			3
h. Railway, Street	M.	24													3									3
	F.	4																						
i. Automobile, Accidents	M.	13																						
	F.	4																						
j. Injuries by Vehicle	M.	14				1									1									2
	F.	2								1														1
k. Gun Shot	M.	12	1												2									3

TABLE VI—CONTINUED. NEW LONDON COUNTY—1908.

CAUSES OF DEATH.		STATE.	New London.	Bozrah.	Colchester.	East Lyme.	Franklin.	Griswold.	Groton.	Lebanon.	Ledyard.	Lisbon.	Lyme.	Montville.	Norwich.	No. Stonington.	Old Lyme.	Preston.	Salem.	Sprague.	Stonington.	Voluntown.	Waterford.	TOTAL.
Burns and Scalds	M.	37	2												3					1				6
	F.	47																			2			2
Heat and Sunstroke	M.	13																						
	F.	8																						
Cold and Freezing	M.	5																						
	F.	1														1								1
Electric Shock	M.	4																						
a. Lightning	M.	4													1									1
	F.	1																						
Accidental Drowning	M.	126	5					1				2			4					2				14
	F.	16	1			1									1									3
Starvation and Privation	F.	1																						
Absorption of Deleterious Gases (Suicide ex.)	M.	19																						
	F.	1																						
Other Acute Poisonings	M.	28	1						3							1								5
	F.	22	2		1			1							1									5
Other External Violence—																								
a. Suffocation	M.	15	1		1																			2
	F.	7																						
b. Injuries at birth	M.	80	1												1						1		1	4
	F.	40			1			3							1						1			6

Capital Punishment—Execution	M.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Homicides	M.	6	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	9	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	
a. Gunshot	M.	10	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	6	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
b. Stab or Cut	M.	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total from Violence		1207	37	...	5	5	...	7	8	3	1	4	1	1	32	2	..	1	..	3	7	1	1	119
Class XIV.—Ill-defined Diseases.																							
Dropsy	M.	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Inanition (over 3 months)	M.	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	9	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Marasmus (over 3 months)	M.	57	1	...	...	...	...	...	1	...	...	...	...	...	2	...	...	...	...	...	1	...	5
	F.	36	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	2
Ill-defined	M.	30	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1
	F.	19	...	...	1	...	...	...	...	...	...	...	...	...	2	...	...	...	...	1	...	...	4
Causes unknown	M.	30	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	13	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
Total Unspecified Causes		210	3	...	1	...	...	1	1	...	...	...	...	...	6	...	...	...	...	2	1	...	15
Grand Total		16000	318	9	43	33	11	68	121	22	15	18	11	40	446	25	16	45	4	39	134	11	37	1466

TABLE VI.

FAIRFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Danbury.	Bridgeport.	Bethel.	Brookfield.	Darien.	Easton.	Fairfield.	Greenwich.	Huntington.	Monroe.	New Canaan.	New Fairfield.	Newtown.	Norwalk.	Redding.	Ridgefield.	Sherman.	Stamford.	Stratford.	Trumbull.	Weston.	Westport.	Wilton.	TOTAL.
Nomenclature of Statistics of Death.																										
CLASS I.—GENERAL DISEASES.																										
Typhoid Fever	M.	126	2	11	...	...	...	...	...	...	...	...	...	1	...	8	...	...	...	2	...	...	...	...	...	24
	F.	68	1	5	...	...	...	...	...	...	...	...	...	...	...	2	...	1	...	1	...	...	1	...	...	11
Fever, Intermittent	M.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	....
a. Malaria	M.	13	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
	F.	12	...	...	1	...	...	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4
b. Remittent Fever	M.	2	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1
Measles	M.	46	...	3	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	5
	F.	42	1	3	...	...	...	...	...	5	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	11
Scarlatina	M.	32	1	1	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	1	...	...	...	...	...	5
	F.	28	...	4	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	3	1	...	...	...	...	10
Whooping Cough	M.	39	...	1	1	...	...	...	...	...	...	...	...	...	...	7	...	...	...	1	1	1	...	...	...	12
	F.	56	...	7	...	...	...	...	1	...	1	...	...	...	...	2	...	...	...	3	...	1	...	...	...	15
Diphtheria—Membranous Croup	M.	100	2	10	...	...	...	...	...	4	1	...	...	...	...	2	...	...	...	2	...	...	...	...	...	21
	F.	94	1	10	...	...	...	...	1	4	2	...	...	...	...	3	...	...	...	1	1	...	...	1	...	24
Grippe—Influenza	M.	177	4	4	1	...	3	...	1	4	1	...	...	...	2	3	...	...	...	3	1	1	1	2	1	32
	F.	219	2	7	...	...	1	...	1	5	...	...	1	...	2	8	...	...	...	6	...	...	...	2	...	35
Cholera, Nostras	M.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	....
	F.	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1
Dysentery	M.	33	...	4	...	...	...	...	...	2	...	...	...	...	...	1	...	1	...	...	1	...	...	...	...	9
	F.	50	4	2	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	8

Erysipelas	M.	21		2						1										1					4
	F.	21		2														1		1					4
Other Epidemic Affections	F.	5																							
Purulent Infection and Septicæmia	M.	21		4																1					5
	F.	8																							
a. Pyæmia	M.	10	1	1						2															4
	F.	4																							
Rabies	M.	1																							
Tubercle of Larynx	M.	8		1						1						1									3
	F.	2		1																					1
Tubercle of Lungs	M.	802	22	82	1		7	1		9	4	1	5	1	2	20	1	2	1	20	5	1		3	2	190
	F.	589	15	58	1		1	1		8	3		2	1	2	17				9	2			6		126
Tubercle of Meninges	M.	52	1	8							1					1				3	1					15
	F.	37	1	9					1												1					12
Tubercle, Abdominal	M.	30		1			1			1						1										4
	F.	21																								
Pott's Disease, Psoas Abscess	M.	5		1																1						2
	F.	2		1																						1
Abscess, Cold and by Congestion	M.	3		1																						1
White Tumors (White Swellings)	M.	5																								
	F.	1	1																							1
Tubercle of Other Organs	M.	10																								
	F.	2		1																						1
Generalized Tubercle	M.	24	1	4																						5
	F.	16	1	4																						5
Scrofula	F.	2																								
Syphilis	M.	15		1			1													1						3
	F.	12		3																						3
Gonorrhœal Infections of Children	M.	1		1																						1
Cancer and Other Malig. Tumors of Buc. Cavity	M.	1																								
of Lips	M.	7																								
of Maxilla	M.	7		1																						1
	F.	5		4																						4

TABLE VI—CONTINUED. FAIRFIELD COUNTY—1908

CAUSES OF DEATH.		STATE.	Danbury.	Bridgeport.	Bethel.	Brookfield.	Darien.	Easton.	Fairfield.	Greenwich.	Huntington.	Monroe.	New Canaan.	New Fairfield.	Newtown.	Norwalk.	Redding.	Ridgefield.	Sherman.	Stamford.	Stratford.	Trumbull.	Weston.	Westport.	Wilton.	TOTAL.
Cancer of Tongue	M.	8		1																						1
Cancer and Other Malignant Tumors of Stomach and Liver—	M.	2									1															1
	F.	1																								
of Gall Bladder	M.	3		1																						1
	F.	4																								
of Liver	M.	32		4			1			1						1										7
	F.	38	1																	2	1			1		5
Œsophagus	M.	2																								
of Pancreas	M.	3																								
	F.	5																								
of Pylorus	M.	2		1																						1
	F.	1																								
of Stomach	M.	96	4	2		1					1					4				3	1		1			17
	F.	79	3	6				1		3	2					2				1				1		19
Can. and Oth. Malig. Tum. of Perit'm., Intes. and Rect.—	M.	1																								
	F.	4																1		1						2
of Colon	M.	1																								
	F.	7									1															1
of Intestines	M.	20		1																2						3
	F.	34	1	5																1						7
of Rectum	M.	10		3																						3
	F.	22		1									1			1						1				4

Cancer of Sigmoid Flexure	M.	1		1																						1
	F.	3																								
of Spleen	F.	1																								
of Peritoneum	F.	4			1																				1		2
Can. and Other Malig. Tum. of the Female Genitals—																										
of Cervix	F.	6		3																						3
of Ovary	F.	8		3																						3
of Uterus	F.	118	2	6	1		1		2	5			1			5				4	1			1	1	30
of Vagina	F.	1																								
of Vulva	F.	1																								
Cancer and Other Malig. Tumors of the Breast	F.	88		11						1	1		1		1	4		1		2				2		24
Cancer and Other Malig. Tumors of the Skin—	M.	8														1										1
	F.	4																								
of Face	M.	14					1			1												1				3
	F.	4			1												1									2
Cancer and Other Malignant Tumors of Other Organs and Organs not Specified—	M.	57		5						1				1	1					3						11
	F.	51	1	4	1					1	1		1			4	1	1		3				1		19
of Abdomen	M.	1														1										1
	F.	3																								
of Bladder	M.	8	1																							1
	F.	3																								
of Lungs	M.	2																		1						1
	F.	1																								
of Pelvis	M.	3		1																						1
	F.	3								1										1						2
of Penis	M.	1																								
of Testicle	M.	2																								
Other Tumors (Tum. of Female Genitals exc.)	M.	3																								
	F.	2		1																						1
a. Abdominal	M.	2																								
	F.	8		1																						1
b. Intestinal	M.	1		1																						1

TABLE VI—CONTINUED. FAIRFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Danbury.	Bridgeport.	Bethel.	Brookfield.	Darien.	Easton.	Fairfield.	Greenwich.	Huntington.	Monroe.	New Canaan.	New Fairfield.	Newtown.	Norwalk.	Redding.	Ridgefield.	Sherman.	Stamford.	Stratford.	Trumbull.	Weston.	Westport.	Wilton.	TOTAL.
Rheumatism, Acute, Articular	M.	36	1	2			1			1											1				1	7
	F.	49	1	5						1						1				1	2					11
Rheumatism, Chronic, and Gout	M.	13	1	1																						2
	F.	18	1	1																						2
Scorbutus	M.	1																								
Diabetes	M.	72	3	7		1	1	2					1		1	1		1						1		19
	F.	104		6	2		1			1	1					1				1				2	2	17
Goiter, Exophthalmic	F.	7																								
Addison's Disease	M.	4														1										1
	F.	1																								
Leukæmia	M.	2																								
	F.	1																								
Hodgkin's Disease	M.	4																								
Anæmia, Chlorosis	M.	4																		1						1
	F.	5																								
Anæmia, Pernicious	M.	10											1							2						3
	F.	24	3	2												2				3						10
Other General Diseases	M.	2		1																						1
	F.	2		1																						1
Alcoholism, Acute and Chronic	M.	49	1	2						1			1			2										7
	F.	11								1																1
a. Delirium Tremens	M.	10		3																						3

Saturnism	M.	1																								
	F.	2																						1		1
Other Chronic Poisonings	M.	4																								
	F.	4		1														1								2
Total General Diseases		4133	86	358	11	2	20	5	8	72	21	1	15	4	11	109	4	10	1	97	21	6	3	25	7	897
CLASS II.—DISEASES OF THE NERVOUS SYSTEM AND ORGANS OF SPECIAL SENSE.																										
Encephalitis	F.	1																								
Meningitis, Simple	M.	94	3	9	1					2						3				4						22
	F.	80	4	3	2			1		1	1				1	1		1		1	1					17
a. Epidemic Cerebro-spinal Meningitis	M.	1																								
b. Cerebro-spinal Meningitis	M.	23		4																						4
	F.	33		7						1						1										9
c. Lepto-Meningitis	M.	1																								
	F.	2																								
d. Spinal-Meningitis	M.	14		1													2									3
	F.	14		4											1											5
Locomotor Ataxia, Progressive	M.	23		3												2						1				6
	F.	4																								
Other Diseases of the Spinal Cord	M.	13	1	1																						2
	F.	16		1									1													2
a. Lateral Sclerosis	M.	7		1											1											2
	F.	5											1													1
b. Muscular Atrophy	F.	1		1																						1
c. Paralysis Agitans	M.	10																		1						1
	F.	5								1																1
Cerebral Congestion—Hemorrhage	M.	431	5	19			6		3	13			3		5	20	1	1	1	9	4		1	2	1	94
	F.	492	10	15	3		1	3	3	8	1	1	3	1	5	19		1	2	11	3				1	91
Cerebral Softening	M.	15	1				1													1						3
	F.	17	2																	2						4

TABLE VI—CONTINUED. FAIRFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Danbury.	Bridgeport.	Bethel.	Brookfield.	Darien.	Easton.	Fairfield.	Greenwich.	Huntington.	Monroe	New Canaan.	New Fairfield.	Newtown.	Norwalk.	Redding.	Ridgefield.	Sherman.	Stamford.	Stratford.	Trumbull.	Weston.	Westport.	Wilton.	TOTAL.
Paralysis without Specified Cause	M.	43		1			2									2				3						8
	F.	88		1						3			1						1	2			1			9
a. Hemiplegia	M.	18		1			2									3						1				7
	F.	13																1								1
b. Paraplegia	F.	3	1	1																						2
Paralysis, General	M.	40	2	2																5				4		13
	F.	18	2	2			1			1										1				3		10
Other Forms of Mental Alienation	M.	10																		1				2		3
	F.	26																		1				5		6
Epilepsy	M.	25		1						1																2
	F.	34		3												1				1			1			6
Eclampsia (non-puerperal) (5 years and over)	M.	1																								
	F.	7		1																						1
Convulsions of Children (under 5)	M.	71	2	9					1							2				3						17
	F.	58	1	6			1		1	1						4			1	2						17
Tetanus	M.	8	1																							1
	F.	2																								
a. Trismus Nascentium	M.	7		1					1																	2
	F.	2																								
Chorea	F.	5		1																						1
Other Diseases of the Nervous System	M.	7		1	1																					2
	F.	13		1																						1
a. Organic Brain Disease	M.	1																								

b. Cerebral Anæmia	F.	1																								
c. Cerebral Tumor	M.	16	1	1									1			1	1									5
	F.	10																								
d. Labio-glosso-laryngeal Paralysis	M.	1																								
e. Neuralgia	F.	1																								
f. Neurasthenia	M.	1																								
	F.	4		1																1						2
g. Multiple Neuritis	F.	1																								
Diseases of the Eye and its Adnexa	M.	1																								
Diseases of the Ear—Otitis	M.	12		1																						1
	F.	7																		1						1
Total Diseases of Nervous System		1807	36	104	7	...	14	4	9	32	2	1	10	1	13	59	4	4	5	50	8	2	3	16	2	386
CLASS III.—DISEASES OF THE CIRCULATORY SYSTEM.																										
Pericarditis	M.	6	1	2						1																4
	F.	8	1	1																						2
Endocarditis, Acute	M.	63		16						1						2				14			1			34
	F.	73	3	19						1			1			2				6						32
a. Myocarditis	M.	43		3							1		1							7		1				13
	F.	40		7					1							1				4						13
Organic Diseases of the Heart	M.	442	8	41	1		21		3	4			1		2	13	1			8	5	1	1	3		113
	F.	454	7	42	1	1	2		6	7	1			1	3	9				4	3	1		4		92
a. Cardiac Asthma	M.	1																								
	F.	1																								
b. Fatty Degeneration	M.	24	1					1																		2
	F.	33	2		1																					3
c. Valvular	M.	203	7	3		1	3		1		1	1			1	3		1		6				1	4	33
	F.	168	8		1						1	2			1	9				2	1	1	2			28
Angina Pectoris	M.	54	2	4					1	1	1					1				1				1		12
	F.	32	3	1	1											2				1					1	9

TABLE VI—CONTINUED. FAIRFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Danbury.	Bridgeport.	Bethel.	Brookfield.	Darien.	Easton.	Fairfield.	Greenwich.	Huntington.	Monroe.	New Canaan.	New Fairfield.	Newtown.	Norwalk.	Redding.	Ridgefield.	Sherman.	Stamford.	Stratford.	Trumbull.	Weston.	Westport.	Wilton.	TOTAL.
Affec. of the Arteries (Atheroma, Aneurism, etc.)	M.	8	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	13	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	4
a. Aneurism of the Aorta	M.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
b. Arterio-Sclerosis	M.	142	1	11	...	...	...	...	2	4	1	...	1	...	1	3	...	1	...	1	...	1	...	1	...	28
	F.	91	2	11	...	...	...	...	2	1	...	...	1	...	...	1	...	...	...	2	...	...	...	2	...	22
c. Atheroma of Coronary Arteries	M.	7	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	5	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Embolus and Thrombosis (non-puerperal)	M.	29	...	6	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	8
	F.	38	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	4
Aff. of Veins (Varices, Hemorrhoids, Phlebitis)	F.	5	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
Affec. of the Lymp. Sys. (Lymphangitis, etc.)	M.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hemorrhages	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
a. Purpura Hemorrhagica	M.	4	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total of Circulatory System		1997	46	175	5	3	26	1	16	20	6	3	5	1	9	47	1	2	..	58	10	5	4	14	5	462
CLASS IV.—DISEASES OF THE RESPIRATORY SYSTEM.																										
Affections of the Larynx	M.	3	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
a. Laryngitis	M.	8	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3
	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

b. Laryngismus Stridulus	M.	1	---	1	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	1
Affections of the Thyroid Body	F.	2	---	---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	----
Bronchitis, Acute	M.	83	3	5	---	---	---	---	1	1	--	--	--	1	--	--	--	--	--	1	2	--	--	--	--	14
	F.	71	3	3	---	---	---	---	---	---	1	--	--	--	--	1	--	--	--	2	2	--	--	1	--	13
a. Capillary	M.	26	---	1	---	---	---	---	---	1	3	--	--	--	--	--	--	--	--	---	--	--	--	--	--	5
	F.	22	---	6	---	---	---	---	---	2	2	--	1	--	--	--	--	--	--	---	--	--	--	--	--	11
Bronchitis, Chronic	M.	66	5	2	---	---	---	---	---	2	1	--	1	--	1	1	--	--	--	2	1	--	--	1	--	17
	F.	74	2	3	---	---	---	---	2	1	--	--	--	--	--	5	--	--	--	---	--	--	--	--	--	13
Broncho-Pneumonia	M.	161	---	15	---	---	---	---	---	3	1	--	--	--	1	1	--	--	--	4	--	--	--	--	--	25
	F.	148	3	5	---	---	1	---	---	1	3	--	--	--	1	1	--	--	--	5	1	--	--	--	--	21
Pneumonia	M.	524	13	49	3	---	3	---	---	9	3	1	1	--	--	13	--	1	--	16	5	--	--	3	--	120
	F.	495	14	58	1	1	2	2	1	7	5	--	--	--	1	11	1	--	1	22	6	--	--	1	--	134
a. Pleuro-Pneumonia	M.	17	---	1	1	---	---	---	---	---	--	--	--	--	--	--	--	--	1	---	1	--	--	--	--	4
	F.	25	1	2	1	---	---	---	---	1	--	1	--	--	--	--	--	--	--	2	--	--	--	--	--	8
Pleurisy	M.	16	---	1	---	---	---	---	1	---	--	--	--	--	--	--	--	--	--	---	1	--	--	--	--	3
	F.	17	1	3	---	---	---	---	---	---	--	--	--	--	--	1	--	--	--	---	--	--	--	--	--	5
Pulmonary Congestion and Apoplexy	M.	18	1	2	---	---	---	---	---	1	--	--	1	--	--	--	--	--	--	---	--	--	--	--	--	5
	F.	30	---	4	---	---	---	---	---	---	--	--	--	--	--	2	--	--	--	---	--	--	--	--	--	6
Gangrene of the Lung	M.	1	---	---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	----
Asthma	M.	8	---	1	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	1
	F.	10	---	1	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	2
Pulmonary Emphysema	M.	4	---	1	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	1
	F.	3	---	---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	----
Other Dis. of Respiratory Appar. (Phthisis exc.)	M.	2	---	---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	----
	F.	3	---	---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	----
a. Abscess of the Lung	M.	5	---	1	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	1
	F.	4	---	---	---	---	---	---	---	---	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	----
b. Pulmonary Hemorrhage	M.	4	---	1	---	---	---	---	---	1	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	2
	F.	4	---	1	---	---	---	---	---	2	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	3
Total of Respiratory System		1858	46	171	6	1	6	2	5	32	19	2	4	1	4	36	1	1	2	55	19	--	--	6	--	419

TABLE VI—CONTINUED. FAIRFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Danbury.	Bridgeport.	Bethel.	Brookfield.	Darien.	Easton.	Fairfield.	Greenwich.	Huntington.	Monroe.	New Canaan.	New Fairfield.	Newtown.	Norwalk.	Redding.	Ridgefield.	Sherman.	Stamford.	Stratford.	Trumbull.	Weston.	Westport.	Wilton.	TOTAL.
CLASS V.—DISEASES OF THE DIGESTIVE APPARATUS.																										
Affections of the Mouth and its Adnexa	M.	2	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	6	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Affections of the Pharynx	M.	4	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
a. Quinsy	M.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1
b. Tonsilitis	M.	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1
Affections of the Œsophagus	M.	4	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ulcer of the Stomach	M.	15	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	3
	F.	11	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	3
Other Affect. of the Stomach (Cancer excepted)	M.	7	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	3
	F.	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
a. Gastritis	M.	37	2	2	1	...	1	...	1	...	1	...	...	...	...	1	...	...	...	1	...	...	...	...	...	10
	F.	65	2	6	...	...	...	...	2	...	...	...	...	...	...	1	...	...	...	2	...	...	...	...	...	13
b. Gastric Catarrh	M.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

c. Gastric Hemorrhage	M.	2																							
	F.	4																							
d. Indigestion	M.	49		3						4								1			2				10
	F.	53	2	1					1	3				1		1				1	1				11
Diarrhœa and Enteritis (under 2 years)	M.	39		5												1		1		3		1			1	12
	F.	27		3												3				4						10
a. Colitis	M.	6	1	1																						2
	F.	5														1		1								2
b. Cholera Infantum	M.	197	4	22					1	3	2		1			2				6		1				43
	F.	200	6	25					1	6	2					4		1		4	1			1		51
c. Entero Colitis	M.	58		4							1					2					1					8
	F.	47		6					1		1					1				2						11
d. Enteritis	M.	43	2	2					2	1						1										8
	F.	45	1	1	1						1													1		5
e. Gastro-Enteritis	M.	133	4	20						5	1					1				6				1		38
	F.	113	1	18		1	1			4						5				3					1	34
f. Diarrhœa	M.	39		4																						4
	F.	37		4																	2					6
Diarrhœa and Enteritis (2 yrs. and over)	M.	17	2	1																1						4
	F.	17		2												1					1					4
a. Colitis	M.	2		1						1																2
	F.	8	1																	1						2
b. Diarrhœa	M.	14	1	1							1									1		1				5
	F.	27	1	1				1								1										4
c. Enteritis	M.	8										1								1						2
	F.	17														1							2			3
d. Entero Colitis	M.	6		2																						2
	F.	10	1																							1
e. Gastro-Enteritis	M.	16	1	2			2																	1		6
	F.	19		1																	1					2
Hernias: Intestinal Obstructions—																										
a. Hernia	M.	21		2																						2
	F.	26		6									1													7

TABLE VI—CONTINUED. FAIRFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Danbury.	Bridgeport.	Bethel.	Brookfield.	Darien.	Easton.	Fairfield.	Greenwich.	Huntington.	Monroe.	New Canaan.	New Fairfield.	Newtown.	Norwalk.	Redding.	Ridgefield.	Sherman.	Stamford.	Stratford.	Trumbull.	Weston.	Westport.	Wilton.	TOTAL.
b. Volvulus	M.	3																								
	F.	2		1																						1
c. Intestinal Obstruction	M.	56	3	7			1			2	1					3				3						20
	F.	43		3					1	1						1		1								7
Other Affections of Intestines	M.	18		1			1													2					1	5
	F.	7														1										1
a. Intestinal Hemorrhage	M.	1																								
	F.	3		2																						2
Acute Yellow Atrophy of Liver	F.	3																								
Tumors, Hydatid, of the Liver	F.	2																								
Cirrhosis of the Liver	M.	85	2	10	2		1			1						2	1			5		1				25
	F.	33		4		1														3				1		9
a. Hepatitis, interstitial or chronic	M.	2														1										1
	F.	6														1										1
b. Amyloid Degeneration of Liver	F.	1																								
c. Slow atrophy of Liver	M.	1																								
	F.	1																								
Biliary Calculi	M.	4																								
	F.	17		3																						3
Other Affections of Liver	M.	17		2								1						1								4
	F.	24		1												2		1		1						5
a. Abscess	M.	3																								
	F.	3																								
b. Tumor	F.	1							1																	1

c. Hypertrophy	F.	1																								
d. Jaundice (3 mos. and over)	M.	3																		1						1
	F.	4								1										1						2
e. Acute Hepatitis (3 mos. and over)	M.	8																								
	F.	1																								
Affections of the Spleen	M.	2																								
	F.	3		1																						1
Peritonitis, Simple (Puerperal excepted)	M.	10	1	1																						2
	F.	22	2	1						1																4
Oth. Affec. of Diges. Appar. (Canc. and Tub. ex.)	M.	3																								
	F.	2																								
Appendicitis and Abscess of the Iliac Fossa—																										
a. Appendicitis	M.	49	1	5															1	1						8
	F.	35	1	1						1						1				2		1				7
Total of Digestive System		1953	42	196	4	2	8	1	12	34	11	2	2	1		40	1	7	1	59	9	5	2	7	3	449
CLASS VI.—DISEASES OF THE GENITO-URINARY APPARATUS AND ITS ADNEXA.																										
Nephritis, Acute	M.	71		10						3			2			2				1				1		19
	F.	72	2	9	1				1	1					1	1				3	1					20
Bright's Disease	M.	482	15	50		1	3		1	11	2	1			2	10	2	2		16	1	1	1	1	1	121
	F.	370	12	48	1		3			8	2				1	11	1	2		12		3		8	2	109
a. Albuminuria	M.	2																								
	F.	2																								
b. Uræmia	M.	21		3												1				1						5
	F.	18		2					1						2											5
Other Diseases of the Kidneys and their Adnexa	M.	19		3						1				1		1										6
	F.	10		2						1										1						4
a. Myoma and Abscess of Kidney	F.	2	1	1																						2
b. Congestion, renal	M.	1																								

TABLE VI—CONTINUED. FAIRFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Danbury.	Bridgeport.	Bethel.	Brookfield.	Darien.	Easton.	Fairfield.	Greenwich.	Huntington.	Monroe.	New Canaan.	New Fairfield.	Newtown.	Norwalk.	Redding.	Ridgefield.	Sherman.	Stamford.	Stratford.	Trumbull.	Weston.	Westport.	Wilton.	TOTAL.
Calculi of the Urinary Tract	M.	6		1																						1
	F.	1																								
Diseases of the Bladder	M.	5																						1		1
	F.	3																								
a. Cystitis	M.	56	1	3			1		1	1						3										10
	F.	2								1																1
b. Retention of the Urine	M.	3																								
Diseases of the Urethra	M.	3	1													1										2
	F.	2		2																						2
Diseases of the Prostate	M.	40	2	2	1	1						1														7
Non-venereal Diseases of Male Genital Organs	M.	1																								
Hemorrhage, Uterine (non-puerperal)	F.	1																								
Tumor, Uterine (non-cancerous)	F.	21		1																1						2
Other Diseases of the Uterus	F.	4								1																1
a. Pelvic Abscess	F.	6																		1						1
Cysts, and Other Tumors of the Ovary	F.	13																								
Other Diseases of the Female Genital Organs	F.	4	1																							1
a. Pyosalpinx	F.	7	2	1																						3
b. Salpingitis	F.	3		2																						2
Non-puerperal Diseases of the Breast. (Cancer ex.)	F.	2														1										1
Total Genito-Urinary System		1253	37	140	3	2	7		4	28	4	2	2	1	6	31	3	4		36	2	4	1	6	3	326

CLASS VII.—THE PUERPERAL STATE.

Accidents of Pregnancy	F.	21	1	2	1					1						1					1					6
a. Abortion	F.	4																								1
b. Tubal Pregnancy	F.	2																								
Hemorrhage, Puerperal	F.	10		2																1						8
Other Accidents of Labor	F.	5		1									1													2
a. Dystocia	F.	2		1																						1
b. Placenta Previa	F.	7								1						1										2
Septicæmia, Puerperal	F.	32	1						1							2				2						6
Albuminuria and Puerperal Eclampsia	F.	30		6						1																7
Other Puerperal Accidents	F.	8		1																						1
Total Diseases of the Puerperal State		121	2	13	1				1	3			1			4				3	1					29

CLASS VIII.—DISEASES OF THE SKIN AND CELLULAR TISSUE.

Gangrene	M.	25	1	1			2																			4
	F.	15		1												1				1						3
Furuncle (Carbuncle)	M.	3					1																			1
	F.	2																								
Abscess	M.	5																		1						1
	F.	3		1												1										2
Other Diseases of Skin	M.	4																								
	F.	10		2						1																3
Total Dis. of Integumentary and Cellular Tissue		67	1	5			3			1						2				2						14

TABLE VI—CONTINUED. FAIRFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Danbury.	Bridgeport.	Bethel.	Brookfield.	Darien.	Easton.	Fairfield.	Greenwich.	Huntington.	Monroe.	New Canaan.	New Fairfield.	Newtown.	Norwalk.	Redding.	Ridgefield.	Sherman.	Stamford.	Stratford.	Trumbull.	Weston.	Westport.	Wilton.	TOTAL.
CLASS IX.—DISEASES OF THE ORGANS OF LOCOMOTION.																										
Affections of the Bones (non-tuberculous)	F.	4																1								1
a. Abscess, Mastoid	M.	7																								
	F.	5																								
b. Rachitis	M.	9																								
	F.	5		1																						1
c. Osteo-Myelitis	M.	3																		1						1
Arthritis, Oth. Affec. of Jts. (Tub. and Rhm. ex.)	M.	3																								
Total Organs of Locomotion		36		1														1		1						3
CLASS X.—MALFORMATIONS.																										
Malformations, Congenital (Stillbirths excepted)	M.	47	1	3		1										1				3				2		11
	F.	56		3	2				3	2						1				1						12
a. Hydrocephalus	M.	13		2																1						3
	F.	5	1	1												1										3
b. Cyanosis	M.	7														1										1
	F.	6																								
c. Spina Bifida	M.	4							1																	1
	F.	5	1													1										2
d. Open Foramen Ovale	M.	14																								
	F.	7	1							2																3
e. Imperforate Anus	M.	2		1																						1
Total Malformations		166	4	10	2	1			4	4						5				5				2		37

CLASS XI.—EARLY INFANCY.																										
Congenital Debility	M.	102	3	5	1					1	2			1		1		1		3				1		19
	F.	70		6	1															5	1					13
a. Atelectasis	M.	17		2												1										3
	F.	16		1												1										2
b. Icterus Neonatorum	M.	21		2												3				1	1					7
	F.	7								1																1
c. Premature Birth	M.	270	1	18					4	8	1				1	1				5	2					41
	F.	203		21	1				1	4						3				6	1			1		33
Other Diseases of Early Infancy	M.	28		1												1	1			1	1					5
	F.	22																								
a. Umbilical Hemorrhage	M.	6	1	1																				1		3
	F.	5																						1		1
Inanition under 3 months	M.	70		15	1						1					4				1						22
	F.	51	1	17						2	2					2				1						25
Total Early Infancy		888	6	89	4				5	16	6			1	1	17	1	1		23	6			4		180
CLASS XII.—OLD AGE.																										
Senile Debility	M.	124		4			9			2			1	2			1	1		4	1			1		26
	F.	180	2	6	2		1	1	2	3	1					1				8		1				28
Total Old Age		304	2	10	2		10	1	2	5	1		1	2		1	1	1		12	1	1		1		54
CLASS XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																										
Suicide by Poison	M.	6		1																						1
	F.	9		1										1												2

TABLE VI—CONTINUED. FAIRFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Danbury.	Bridgeport.	Bethel.	Brookfield.	Darien.	Easton.	Fairfield.	Greenwich.	Huntington.	Monroe.	New Canaan.	New Fairfield.	Newtown.	Norwalk.	Redding.	Ridgefield.	Sherman.	Stamford.	Stratford.	Trumbull.	Weston.	Westport.	Wilton.	TOTAL.
a. Narcotic Poison	M.	4	1																							1
	F.	2	1																							1
b. Carbolic Acid	M.	42	1	3																						4
	F.	17	1	2																						3
Suicide by Asphyxia	M.	1																								
a. Inhalation of Illuminating Gas	M.	15		2							1									1						4
	F.	4		1																						1
Suicide by Hanging or Strangulation	M.	11							1	1					1											3
	F.	6																						1		1
Suicide by Drowning	M.	10		1																						1
	F.	8		1																				1		2
Suicide by Firearms	M.	42		2						1						1								1		5
	F.	3																								
Suicide by Cutting Instruments	M.	13	2	1																				1	1	5
Suicide by Jumping from high places	M.	2																								
Other Suicides	M.	3																								
Total Suicides		198	6	15					1	2	1			1	1	1				1				4	1	34
Fractures, not specified—																										
a. Arms and Legs	M.	2																								
b. Femur	M.	3																								
	F.	3																								

c. Hip	M.	5		1																						1
	F.	8		1												1										2
d. Neck	M.	2																								
e. Ribs	M.	3													1											1
f. Skull	M.	16		3												1				1						5
	F.	5		1																						1
g. Vertebra	M.	7		2																1						3
	F.	1																								
Dislocations	M.	1	1																							1
Other Accidental Traumatisms	M.	49		3							1					1				1						6
	F.	6																								
a. Cerebral Concussion	M.	4		2						1																3
	F.	1		1																						1
b. Fall	M.	79	6	4						2										1				1		14
	F.	51	2		1					1						2				2			1			9
c. Fall from pole	M.	1																								
d. Fall from window	M.	7																								
	F.	1																								
e. Kick of Horse	M.	6	1										1													2
f. Live Electric Wire	M.	1								1																1
g. Railway, Steam	M.	148	2	12			5		5	8					1	7	3			7	1			1	1	53
	F.	11		1						1											1					3
h. Railway, Street	M.	24		1												1										2
	F.	4		2																						2
i. Automobile, Accidents	M.	13					1			1																2
	F.	4		2																1						3
j. Injuries by Vehicle	M.	14		1																1				1		3
	F.	2																								
k. Gun Shot	F.	12	1										1					1								3

TABLE VI—Continued. Fairfield County—1908.

CAUSES OF DEATH.		State.	Danbury.	Bridgeport.	Bethel.	Brookfield.	Darien.	Easton.	Fairfield.	Greenwich.	Huntington.	Monroe.	New Canaan.	New Fairfield.	Newtown.	Norwalk.	Redding.	Ridgefield.	Sherman.	Stamford.	Stratford.	Trumbull.	Weston.	Westport.	Wilton.	Total.
Burns and Scalds	M.	37	2	7	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	11
	F.	47	--	8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	--	--	--	1	--	12
Heat and Sunstroke	M.	13	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
	F.	8	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Cold and Freezing	M.	5	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
	F.	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Electric Shock	M.	4	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	2
a. Lightning	M.	4	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
	F.	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Accidental Drowning	M.	126	4	13	1	--	1	--	2	3	3	--	--	--	--	1	--	--	--	4	4	1	--	1	--	38
	F.	16	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--	3
Starvation and Privation	F.	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Absorption of Deleterious Gases (Suicide ex.)	M.	19	--	1	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	1	--	--	--	--	--	3
	F.	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other Acute Poisonings	M.	28	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	4
	F.	22	--	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3
Other External Violence—																										
a. Suffocation	M.	15	--	2	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3
	F.	7	--	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3
b. Injuries at birth	M.	80	1	8	--	--	--	--	1	3	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	14
	F.	40	1	7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	9

Capital Punishment—Execution	M.	3																								
Homicides	M.	6	1	1																						2
	F.	9		1																						1
a. Gunshot	M.	10		1			1																			2
	F.	6	1																							1
b. Stab or Cut	M.	6																								
Total from Violence		1207	31	112	2		9		10	25	7		2	1	3	15	3	1		27	9	1	1	9	2	270
CLASS XIV.—ILL-DEFINED DISEASES.																										
Dropsy	M.	6											1											1		2
	F.	1																								
Inanition (over 3 months)	M.	9		3																						3
	F.	9		5																						5
Marasmus (over 3 months)	M.	57	1	4						2	2									5						14
	F.	36		1	1					3										5				1	1	12
Ill-defined	M.	30																								
	F.	19																								
Causes unknown	M.	30																						1		1
	F.	13																								
Total Unspecified Causes		210	1	13	1					5	2		1							10				3	1	37
GRAND TOTAL		16000	340	1397	48	11	103	14	76	277	79	11	43	13	47	366	19	32	9	438	86	24	14	93	23	3563

TABLE VI—Continued.

WINDHAM COUNTY—1908.

CAUSES OF DEATH.		STATE.	Brooklyn.	Ashford.	Canterbury.	Chaplin.	Eastford.	Hampton.	Killingly.	Plainfield.	Pomfret.	Putnam.	Scotland.	Sterling.	Thompson.	Windham.	Woodstock.	TOTAL.
Nomenclature of Statistics of Death.																		
CLASS I.—GENERAL DISEASES.																		
Typhoid Fever	M.	126										1		1	1	1	1	5
	F.	68							1			2				1		4
Fever, Intermittent	M.	2																
	F.	2																
a. Malaria	M.	13														1		1
	F.	12																
b. Remittent Fever	M.	2																
	F.	5																
Measles	M.	46								1								1
	F.	42																
Scarlatina	M.	32																
	F.	28																
Whooping Cough	M.	39						1										1
	F.	56							1	1								2
Diphtheria—Membranous Croup	M.	100							1							1	1	3
	F.	94								1	1	2				1		5
Grippe—Influenza	M.	177	2	1					2	1		1	1			3	2	13
	F.	219	1	3	1				1	3		2	1		1	11	4	28
Cholera, Nostras	M.	3																
	F.	7																
Dysentery	M.	33					1					2						3
	F.	50	1	1												2		4

Erysipelas	M.	21	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	21	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Other Epidemic Affections	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Purulent Infection and Septicæmia	M.	21	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Pyæmia	M.	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	2
Rabies	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tubercle of Larynx	M.	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tubercle of Lungs	M.	802	1	....	1	....	1	....	4	....	....	4	....	2	1	14	1	29
	F.	589	4	....	....	1	....	....	8	3	....	5	....	....	7	9	1	38
Tubercle of Meninges	M.	52	1	....	....	....	....	....	1	....	....	....	....	....	....	1	....	3
	F.	37	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
Tubercle, Abdominal	M.	30	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1
	F.	21	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
Pott's Disease, Psoas Abscess	M.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Abscess, Cold and by Congestion	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
White Tumors (White Swellings)	M.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tubercle of Other Organs	M.	10	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Generalized Tubercle	M.	24	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
	F.	16	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Scrofula	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1
Syphilis	M.	15	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	12	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Gonorrhœal Infections of Children	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cancer and Other Malig. Tumors of Buc. Cavity	M	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
of Lips	M.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
of Maxilla	M.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

TABLE VI—CONTINUED. WINDHAM COUNTY—1908.

CAUSES OF DEATH.		STATE.	Brooklyn.	Ashford.	Canterbury.	Chaplin.	Eastford.	Hampton.	Killingly.	Plainfield.	Pomfret.	Putnam.	Scotland.	Sterling.	Thompson.	Windham.	Woodstock.	TOTAL.
Cancer of Tongue	M.	8	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
Cancer and Other Malignant Tumors of Stomach and Liver—	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
of Gall Bladder	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
of Liver	M.	32	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	38	....	....	....	....	....	....	....	1	....	....	....	....	....	1	....	2
Œsophagus	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
of Pancreas	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
of Pylorus	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
of Stomach	M.	96	....	....	....	....	....	1	1	1	....	....	....	....	....	....	....	3
	F.	79	1	....	....	....	....	....	2	....	....	2	....	....	1	....	1	7
Cancer. and Oth. Malig. Tum. of Perit'm, Intes. and Rect.—	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
of Colon	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
of Intestines	M.	20	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1
	F.	34	....	....	....	....	....	....	....	1	....	1	....	1	....	1	....	4
of Rectum	M.	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	22	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1

Cancer of Sigmoid Flexure	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Spleen	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Peritoneum	F.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
8 Can. and Other Malig. Tum. of the Female Genitals—																		
of Cervix	F.	6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Ovary	F.	8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Uterus	F.	118	----	1	----	1	1	----	----	----	----	1	----	----	1	2	----	7
of Vagina	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Vulva	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cancer and Other Malig. Tumors of the Breast	F.	88	----	----	----	----	----	----	1	----	----	----	----	----	----	----	----	1
Cancer and Other Malig. Tumors of the Skin	M.	8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Face	M.	14	----	----	----	----	----	----	1	----	----	----	----	1	----	1	----	3
	F.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cancer and Other Malignant Tumors of Other Organs and Organs not Specified—	M.	57	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	51	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Abdomen	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Bladder	M.	8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Lungs	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	1	----	----	----	----	----	----	1	----	----	----	----	----	----	----	----	1
of Pelvis	M.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Penis	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Testicle	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Other Tumors (Tum. of the Female Genitals ex.)	M.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
a. Abdominal	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	8	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	1
b. Intestinal	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

TABLE VI—CONTINUED. WINDHAM COUNTY—1908.

CAUSES OF DEATH.		STATE.	Brooklyn.	Ashford.	Canterbury.	Chaplin.	Eastford.	Hampton.	Killingly.	Plainfield.	Pomfret.	Putnam.	Scotland.	Sterling.	Thompson.	Windham.	Woodstock.	TOTAL.
Rheumatism, Acute, Articular	M.	36	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	49	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	1
Rheumatism, Chronic, and Gout	M.	13	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	18	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Scorbutus	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Diabetes	M.	72	----	----	----	----	----	----	1	----	----	1	----	----	----	1	1	4
	F.	104	----	----	----	----	----	----	----	----	----	----	----	----	----	3	----	3
Goiter, Exophthalmic	F.	7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Addison's Disease	M.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Leukæmia	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
a. Hodgkin's Disease	M.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Anæmia, Chlorosis	M.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
a. Anæmia, Pernicious	M.	10	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	1
	F.	24	----	----	----	----	----	----	1	----	----	----	----	----	----	----	----	1
Other General Diseases	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Alcoholism, Acute and Chronic	M.	49	----	----	----	----	----	----	----	1	----	----	----	----	----	1	1	3
	F.	11	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
a. Delirium Tremens	M.	10	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Saturnism	M.	1																
	F.	2																
Other Chronic Poisonings	M.	4																
	F.	4																
Total General Diseases		4133	11	6	2	2	3	2	27	15	1	25	2	6	15	66	13	196
CLASS II.—DISEASES OF THE NERVOUS SYSTEM AND ORGANS OF SPECIAL SENSE.																		
Encephalitis	F.	1																
Meningitis, Simple	M.	94							1						1	3		5
	F.	80							1							1	1	3
a. Epidemic Cerebro-spinal Meningitis	M.	1																
b. Cerebro-spinal Meningitis	M.	23																
	F.	33										1						1
c. Lepto Meningitis	M.	1																
	F.	2																
d. Spinal Meningitis	M.	14																
	F.	14																
Locomotor Ataxia, Progressive	M.	23							2									2
	F.	4																
Other Diseases of the Spinal Cord	M.	13																
	F.	16																
a. Lateral Sclerosis	M.	7																
	F.	5																
b. Muscular Atrophy	F.	1																
c. Paralysis Agitans	M.	10														1	1	2
	F.	5															1	1
Cerebral Congestion—Hemorrhage	M.	431							6	1	1	3			3	5	3	22
	F.	492	2					1	6	3	1	5		2		5		25
Cerebral Softening	M.	15							2									2
	F.	17							2									2

TABLE VI—CONTINUED. WINDHAM COUNTY—1908.

CAUSES OF DEATH.		STATE.	Brooklyn.	Ashford.	Canterbury.	Chaplin.	Eastford.	Hampton.	Killingly.	Plainfield.	Pomfret.	Putnam.	Scotland.	Sterling.	Thompson.	Windham.	Woodstock.	TOTAL.
Paralysis without Specified Cause	M.	43	3	....	....	....	....	1	....	1	....	2	....	....	....	1	....	8
	F.	38	....	....	....	....	....	....	....	1	....	....	....	....	....	1	....	2
a. Hemiplegia	M.	18	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	13	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
b. Paraplegia	F.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Paralysis General	M.	40	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
	F.	18	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Other Forms of Mental Alienation	M.	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	26	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
Epilepsy	M.	25	....	....	....	....	....	....	....	1	....	....	....	....	....	1	....	2
	F.	34	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
Eclampsia (non-puerperal) (5 years and over)	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Convulsions of Children (under 5)	M.	71	1	....	....	....	....	....	2	....	....	2	....	....	....	....	....	5
	F.	58	....	....	....	....	....	....	1	....	....	....	....	....	....	2	....	3
Tetanus,	M.	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Trismus Nascentium	M.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Chorea	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Other Diseases of the Nervous System	M.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	13	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Organic Brain Disease	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

b. Cerebral Anæmia	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
c. Cerebral Tumor	M.	16	----	----	----	----	----	----	----	----	----	1	----	----	----	----	----	1
	F.	10	----	----	----	----	----	----	1	----	----	----	----	----	----	----	----	1
d. Labio-glosso-laryngeal Paralysis	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
e. Neuralgia	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
f. Neurasthenia	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	4	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	1
g. Multiple Neuritis	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Diseases of the Eye and its Adnexa	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Diseases of the Ear—Otitis	M.	12	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1	1
	F.	7	----	----	----	----	----	----	----	----	----	1	----	----	----	----	----	1
Total Diseases of Nervous System		1807	8	----	----	----	----	2	24	8	2	16	----	2	5	21	7	95
CLASS III.—DISEASES OF THE CIRCULATORY SYSTEM																		
Pericarditis	M.	6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Endocarditis, Acute	M.	63	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	1
	F.	73	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
a. Myocarditis	M.	43	----	----	----	----	----	----	----	1	----	----	----	----	----	----	----	1
	F.	40	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Organic Diseases of the Heart	M.	442	2	----	1	----	----	----	6	3	1	3	----	1	1	2	1	21
	F.	454	1	----	----	----	----	1	4	4	1	3	----	1	6	2	2	25
a. Cardiac Asthma	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
b. Fatty Degeneration	M.	24	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	33	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
c. Valvular	M.	203	----	----	----	1	----	----	2	3	4	2	1	----	----	2	1	16
	F.	168	1	----	----	----	----	----	1	1	----	4	----	2	----	6	----	15
Angina Pectoris	M.	54	----	----	----	----	----	----	----	----	----	2	----	----	----	1	----	3
	F.	32	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	1

TABLE VI—CONTINUED. WINDHAM COUNTY—1908.

CAUSES OF DEATH.		STATE.	Brooklyn.	Ashford.	Canterbury.	Chaplin.	Eastford.	Hampton.	Killingly.	Plainfield.	Pomfret.	Putnam.	Scotland.	Sterling.	Thompson.	Windham.	Woodstock.	TOTAL.
Affec. of the Arteries (Atheroma, Aneurism, etc.)	M.	8																
	F.	13																
a. Aneurism of the Aorta	M.	2																
	F.	1														1		1
b. Arterio-Sclerosis	M.	142	1				1		1	1					1	1	2	8
	F.	91														1		1
c. Atheroma of Coronary Arteries	M.	7																
	F.	5														2		2
Embolus and Thrombosis (non-puerperal)	M.	29							1							2		3
	F.	38				1			1					1		1		4
Aff. of Veins (Varices, Hemorrhoids, Phlebitis)	F.	5							1			1						2
Affec. of the Lymp. Sys. (Lymphangitis, etc.)	M.	1																
	F.	2																
Hemorrhages	F.	2																
a. Purpura Hemorrhagica	M.	4							1									1
	F.	2																
Total of Circulatory System		1997	6		1	2	1	1	18	13	6	15	1	5	9	22	6	106
CLASS IV.—DISEASES OF THE RESPIRATORY SYSTEM.																		
Affections of the Larynx	M.	3																
	F.	1																
a. Laryngitis	M.	8																
	F.	2													1			1

b. Laryngismus Stridulus	M.	1																
Affections of the Thyroid Body	F.	2																
Bronchitis, Acute	M.	88							2						8	6		11
	F.	71							1		1		1	1		3		7
a. Capillary	M.	26														1		1
	F.	22						1								1		3
Bronchitis, Chronic	M.	66			1										1		1	3
	F.	74		1			1			1		1					1	5
Broncho-Pneumonia	M.	161				1										1		2
	F.	148										1				1		2
Pneumonia	M.	524		3			1	1	4	2				1	2	1		15
	F.	495		1					4	1	1	2		2	1	4		16
a. Pleuro-Pneumonia	M.	17												1				1
	F.	25														1		1
Pleurisy	M.	16														1		1
	F.	17																
Pulmonary Congestion and Apoplexy	M.	18																
	F.	30																
Gangrene of the Lung	M.	1																
Asthma	M.	8																
	F.	10										1						1
Pulmonary Emphysema	M.	4													1			1
	F.	3																
Other Dis. of Respiratory Appar. (Phthisis exc.)	M.	2																
	F.	3																
a. Abscess of the Lung	M.	5																
	F.	4																
b. Pulmonary Hemorrhage	M.	4																
	F.	4																
Total of Respiratory System		1858	....	5	1	1	2	2	11	4	2	5	1	5	9	20	2	70

TABLE VI—CONTINUED. WINDHAM COUNTY—1908.

CAUSES OF DEATH.		STATE.	Brooklyn.	Ashford.	Canterbury.	Chaplin.	Eastford.	Hampton.	Killingly.	Plainfield.	Pomfret.	Putnam.	Scotland.	Sterling.	Thompson.	Windham.	Woodstock.	TOTAL.
CLASS V.—DISEASES OF THE DIGESTIVE APPARATUS.																		
Affections of the Mouth and its Adnexa	M.	2																
	F.	6																
Affections of the Pharynx	M.	4																
	F.	3																
a. Quinsy	M.	1																
	F.	1																
b. Tonsilitis	M.	4																
	F.	3																
Affections of the Œsophagus	M.	4																
	F.	2																
Ulcer of the Stomach	M.	15														1		1
	F.	11															1	1
Other Affect. of the Stomach (Cancer excepted)	M.	7																
	F.	6								1								1
a. Gastritis	M.	37														2	1	3
	F.	65			1		2		1	1		1			1	2		9
b. Gastric Catarrh	M.	2																
	F.	1																

c. Gastric Hemorrhage	M.	2																
	F.	4																
d. Indigestion	M.	49													1			1
	F.	53							1			1	1		1		2	6
Diarrhœa and Enteritis (under 2 years)	M.	39																
	F.	27																
a. Colitis	M.	6																
	F.	5																
b. Cholera Infantum	M.	197	1						3	3	1				3	7		18
	F.	200							3	1		2			2	4		12
c. Entero Colitis	M.	58								1		1						2
	F.	47														1		1
d. Enteritis	M.	43							1									1
	F.	45																
e. Gastro-Enteritis	M.	133							1	2		1						4
	F.	113								2		1			1	1		5
f. Diarrhœa	M.	39								1								1
	F.	37								1						2		3
Diarrhœa and Enteritis (2 years and over)	M.	17																
	F.	17																
a. Colitis	M.	2																
	F.	8								1								1
b. Diarrhœa	M.	14								1								1
	F.	27																
c. Enteritis	M.	8																
	F.	17																
d. Entero Colitis	M.	6																
	F.	10																
e. Gastro-Enteritis	M.	16																
	F.	19																
Hernias: Intestinal Obstructions—																		
a. Hernia	M.	21										1						1
	F.	26																

TABLE VI—CONTINUED. WINDHAM COUNTY—1908.

CAUSES OF DEATH.		STATE.	Brooklyn.	Ashford.	Canterbury.	Chaplin.	Eastford.	Hampton.	Killingly.	Plainfield.	Pomfret.	Putnam.	Scotland.	Sterling.	Thompson.	Windham.	Woodstock.	TOTAL.
b. Volvulus	M.	3																
	F.	2																
d. Intestinal Obstruction	M.	56														2		2
	F.	43							1									1
Other Affections of Intestines	M.	18										1						1
	F.	7																
a. Intestinal Hemorrhage	M.	1																
	F.	3																
Acute Yellow Atrophy of Liver	F.	3																
Tumors, Hydatid, of the Liver	F.	2																
Cirrhosis of the Liver	M.	85								1		1				1		3
	F.	33													1	1		2
a. Hepatitis, interstitial or chronic	M.	2																
	F.	6																
b. Amyloid Degeneration of Liver	F.	1																
c. Slow Atrophy of the Liver	M.	1																
	F.	1																
Biliary Calculi	M.	4																
	F.	17														1		1
Other Affections of the Liver	M.	17																
	F.	24								1						1		2
a. Abscess	M.	3																
	F.	3																
b. Tumor	F.	1																

c. Hypertrophy	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
d. Jaundice (3 mos. and over)	M.	8	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1
	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
e. Acute Hepatitis (3 mos. and over)	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Affections of the Spleen	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Peritonitis, Simple (Puerperal excepted)	M.	10	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	2
	F.	22	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oth. Affec. of Diges. Appar. (Canc. and Tub. ex.)	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Appendicitis and Abscess of the Iliac Fossa—																		
a. Appendicitis	M.	49	....	....	....	....	....	....	....	1	....	4	....	....	....	1	....	6
	F.	35	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	2
Total of Digestive System		1953	1	....	1	....	2	....	13	18	1	15	1	....	11	28	4	95
CLASS VI.—DISEASES OF THE GENITO-URINARY APPARATUS AND ITS ADNEXA.																		
Nephritis, Acute	M.	71	....	....	....	....	....	....	....	....	....	2	....	....	....	1	....	3
	F.	72	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bright's Disease	M.	482	....	2	....	....	....	....	3	2	1	2	....	....	2	5	....	17
	F.	370	....	....	....	....	....	....	2	3	....	2	....	....	2	8	1	18
a. Albuminuria	M.	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Uræmia	M.	21	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
	F.	18	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Other Diseases of the Kidneys and their Adnexa	M.	19	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
	F.	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Myoma and Abscess of Kidney	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Congestion, renal	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

TABLE VI—CONTINUED. WINDHAM COUNTY—1908.

CAUSES OF DEATH.		STATE.	Brooklyn.	Ashford.	Canterbury.	Chaplin.	Eastford.	Hampton.	Killingly.	Plainfield.	Pomfret.	Putnam.	Scotland.	Sterling.	Thompson.	Windham.	Woodstock.	TOTAL.
Calculi of the Urinary Tract	M.	6	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Diseases of the Bladder	M.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Cystitis	M.	56	....	....	....	....	....	1	....	....	....	1	....	....	....	1	....	3
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Retention of Urine	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Diseases of the Urethra	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Diseases of the Prostate	M.	40	1	....	....	....	....	....	....	....	....	....	....	....	....	3	....	4
Non-venereal Diseases of Male Genital Organs	M.	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Hemorrhage, Uterine (non-puerperal)	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tumor, Uterine (non-cancerous)	F.	21	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Other Diseases of the Uterus	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Pelvic Abscess	F.	6	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
Cysts, and Other Tumors of the Ovary	F.	13	....	....	....	....	....	....	2	....	....	....	....	....	....	1	1	4
Other Diseases of the Female Genital Organs	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Pyosalpinx	F.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Salpingitis	F.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Non-puerperal Diseases of the Breast (Cancer ex.)	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total Genito-Urinary System		1253	3	2	....	....	....	1	9	5	1	8	....	....	4	20	2	55

CLASS VII.—THE PUERPERAL STATE.																		
Accidents of Pregnancy	F.	21															1	1
a. Abortion	F.	4																
b. Tubal Pregnancy	F.	2																
Hemorrhage, Puerperal	F.	10																
Other Accidents of Labor	F.	5																
a. Dystocia	F.	2																
a. Placenta Previa	F.	7													1			1
Septicæmia, Puerperal	F.	32	1						2	1								4
Albuminuria and Puerperal Eclampsia	F.	30							1						1			2
Other Puerperal Accidents	F.	8								1						1		2
Total Diseases of the Puerperal State		121	1						3	2					2	1	1	10
CLASS VIII.—DISEASES OF THE SKIN AND CELLULAR TISSUE.																		
Gangrene	M.	25		1	1				1			1						4
	F.	15							1									1
Furuncle (Carbuncle)	M.	3																
	F.	2																
Abscess	M.	5																
	F.	3																
Other Diseases of Skin	M.	4																
	F.	10																
Total Dis. of Integumentary and Cellular Tissue		67		1	1				2			1						5

TABLE VI—CONTINUED. WINDHAM COUNTY—1908.

CAUSES OF DEATH.		STATE.	Brooklyn.	Ashford.	Canterbury.	Chaplin.	Eastford.	Hampton.	Killingly.	Plainfield.	Pomfret.	Putnam.	Scotland.	Sterling.	Thompson.	Windham.	Woodstock.	TOTAL.
CLASS IX.—DISEASES OF THE ORGANS OF LOCOMOTION.																		
Affections of the Bones (non-tuberculous)	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Abscess, Mastoid	M.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Rachitis	M.	9	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	F.	5	....	....	....	....	....	....	....	1	....	....	....	....	....	1	....	2
c. Osteo-Myelitis	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Arthritis, Oth. Affec. of Jts. (Tub. and Rhm. ex.)	M.	3	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Total Organs of Locomotion		36	....	....	....	....	....	....	1	2	....	....	....	....	....	1	....	4
CLASS X.—MALFORMATIONS.																		
Malformations, Congenital (Stillbirths excepted)	M.	47	1	1	....	....	....	....	1	....	....	....	....	....	1	....	....	4
	F.	56	....	....	....	....	....	....	....	....	....	1	....	....	1	1	....	3
a. Hydrocephalus	M.	13	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Cyanosis	M.	7	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
	F.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
c. Spina Bifida	M.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
d. Open Foramen Ovale	M.	14	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	7	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
e. Imperforate Anus	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total Malformations		166	1	1	....	....	....	....	2	....	....	2	....	....	2	1	....	9

CLASS XI.—EARLY INFANCY.																		
Congenital Debility	M.	103														1		1
	F.	70							1	1					1			3
a. Atelectasis	M.	17									1							1
	F.	16																
b. Icterus Neonatorum	M.	21																
	F.	7																
c. Premature Birth	M.	270	1				1		2			5			1	1		11
	F.	203							1	3		1			1	1	2	9
Other Diseases of Early Infancy	M.	28										1			2	1		4
	F.	22	1													1		2
a. Umbilical Hemorrhage	M.	6																
	F.	5																
Inanition under 3 months	M.	70																
	F.	51										1				1		2
Total Early Infancy		888	2				1		4	4	1	8			5	6	2	33
CLASS XII.—OLD AGE.																		
Senile Debility	M.	124										3				3		6
	F.	180							1			1		1	2	4		9
Total Old Age		304							1			4		1	2	7		15
CLASS XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																		
Suicide by Poison	M.	6																
	F.	9			1													1

TABLE VI—CONTINUED. WINDHAM COUNTY—1908.

CAUSES OF DEATH.		STATE.	Brooklyn.	Ashford.	Canterbury.	Chaplin.	Eastford.	Hampton.	Killingly.	Plainfield.	Pomfret.	Putnam.	Scotland.	Sterling.	Thompson.	Windham.	Woodstock.	TOTAL.
a. Narcotic Poison	M.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Carbolic Acid	M.	42	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
	F.	17	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Suicide by Asphyxia	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Inhalation of Illuminating Gas	M.	15	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Suicide by Hanging or Strangulation	M.	11	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Suicide by Drowning	M.	10	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
	F.	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Suicide by Firearms	M.	42	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	3	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1
Suicide by Cutting Instruments	M.	13	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Suicide by Jumping from high places	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Other Suicides	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total Suicides		198	1	....	1	....	....	....	....	....	....	....	1	....	....	3	....	6
Fractures, not specified—																		
a. Arms and Legs	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Femur	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

c. Hip	M.	5																
	F.	8																
d. Neck	M.	2																
e. Ribs	M.	3																
f. Skull	M.	16																
	F.	5																
g. Vertebra	M.	7																
	F.	1																
Dislocations	M.	1																
Other Accidental Traumatisms	M.	49												1	1		2
	F.	6							1								1
a. Cerebral Concussion	M.	4										1					1
	F.	1															
b. Fall	M.	79						1			1			2			4
	F.	51						1							2		3
c. Fall from pole	M.	1															
d. Fall from window	M.	7															
	F.	1															
e. Kick of Horse	M.	6															
f. Live Electric Wire	M.	1															
g. Railway, Steam	M.	148					1	1			1		1		1		5
	F.	11															
h. Railway, Street	M.	24						1						1	1		3
	F.	4															
i. Automobile, Accidents	M.	13															
	F.	4															
j. Injuries by Vehicle	M.	14															
	F.	2															
k. Gun Shot	M.	12														1	1

TABLE VI—CONTINUED. WINDHAM COUNTY—1908.

CAUSES OF DEATH.		STATE.	Brooklyn.	Ashford.	Canterbury.	Chaplin.	Eastford.	Hampton.	Killingly.	Plainfield.	Pomfret.	Putnam.	Scotland.	Sterling.	Thompson.	Windham.	Woodstock.	TOTAL.
Burns and Scalds	M.	37														1		1
	F.	47									1					2		3
Heat and Sunstroke	M.	13							1									1
	F.	8																
Cold and Freezing	M.	5																
	F.	1																
Electric Shock	M.	4																
a. Lightning	M.	4																
	F.	1																
Accidental Drowning	M.	126							1			1			1		1	4
	F.	16																
Starvation and Privation	F.	1																
Absorption of Deleterious Gases (Suicide ex.)	M.	19							1							1		2
	F.	1																
Other Acute Poisonings	M.	28														1	1	2
	F.	22							1									1
Other External Violence—																		
a. Suffocation	M.	15								1								1
	F.	7																
b. Injuries at birth	M.	80							1							2		3
	F.	40										1	1		1			3

Capital Punishment—Execution	M.	8																
Homicides	M.	6																
	F.	9								1								1
a. Gunshot	M.	10										1						1
	F.	6																
b. Stab or Cut	M.	6																
Total from Violence		1207	1		1			1	9	3	1	5	3	1	6	15	3	49
Class XIV.—Ill-defined Diseases.																		
Dropsy	M.	6																
	F.	1																
Inanition (over 3 mos.)	M.	9																
	F.	9																
Marasmus (over 3 mos.)	M.	57														1		1
	F.	36													1	1		2
Ill-defined	M.	30						1										1
	F.	19																
Causes unknown	M.	30																
	F.	13										1						1
Total Unspecified Causes		210						1				1			1	2		5
Grand Total		16000	34	15	7	5	9	10	124	74	15	105	8	20	71	210	40	747

TABLE VI—Continued.

LITCHFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Litchfield.	Barkhamsted.	Bethlehem.	Bridgewater.	Canaan.	Colebrook.	Cornwall.	Goshen.	Harwinton.	Kent.	Morris.	New Hartford.	New Milford.	Norfolk.	North Canaan.	Plymouth.	Roxbury.	Salisbury.	Sharon.	Thomaston.	Torrington.	Warren.	Washington.	Watertown.	Winchester.	Woodbury.	TOTAL.
Nomenclature of Statistics of Death.																													
CLASS I.—GENERAL DISEASES.																													
Typhoid Fever	M.	126	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	1	...	...	1	1	3	...	9
	F.	68	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	1	...	...	...	1	...	4
Fever, Intermittent	M.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	....
	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	....
a. Malaria	M.	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	....
	F.	12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	....
b. Remittent Fever	M.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	....
	F.	5	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Measles	M.	46	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1
	F.	42	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	2
Scarlatina	M.	32	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	28	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	1	...	...	...	...	...	3
Whooping Cough	M.	39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1
	F.	56	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	2	1	...	5
Diphtheria—Membranous Croup	M.	100	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	2
	F.	94	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	3	...	...	...	...	...	6
Grippe—Influenza	M.	177	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	2	...	3	...	...	...	3	2	12
	F.	219	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	1	2	2	...	...	1	...	1	1	...	...	11
Cholera, Nostras	M.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	....
	F.	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1
Dysentery	M.	33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1
	F.	50	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	1	4

Erysipelas	M.	21																			1							1
	F.	21												1					2									3
Other Epidemic Affections	F.	5																										
Purulent Infection and Septicæmia	M.	21										1																1
	F.	8																										
a. Pyæmia	M.	10																							1			1
	F.	4																										
Rabies	M.	1																								1		1
Tubercle of Larynx	M.	8																										
	F.	2																										
Tubercle of Lungs	M.	802	3	1			1		1		1				4			4	2	5	1	1	7	1	3	4	6	2	47
	F.	589	2	1		1	1		1		1			1	3	1		2	1	5	1		11		1	2	8		43
Tubercle of Meninges	M.	52																		1			1				3		5
	F.	37	1														1												2
Tubercle, Abdominal	M.	30														1							1						2
	F.	21																		3						1			4
Pott's Disease, Psoas Abscess	M.	5																											
	F.	2																				1							1
Abscess, Cold and by Congestion	M.	3																											
White Tumors (White Swellings)	M.	5																											
	F.	1																											
Tubercle of other Organs	M.	10																		3									3
	F.	2																										
Generalized Tubercle	M.	24																										
	F.	16																							1			1
Scrofula	F.	2																										
Syphilis	M.	15	1																1										2
	F.	12																										
Gonorrhœal Infections of Children	M.	1																										
Cancer and Other Malig. Tumors of Buc. Cavity	M.	1																										
of Lips	M.	7																									1	1
of Maxilla	M.	7																				1						1
	F.	5																										

TABLE VI—CONTINUED. LITCHFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Litchfield.	Barkhamsted.	Bethlehem.	Bridgewater.	Canaan.	Colebrook.	Cornwall.	Goshen.	Harwinton.	Kent.	Morris.	New Hartford.	New Milford.	Norfolk.	North Canaan.	Plymouth.	Roxbury.	Salisbury.	Sharon.	Thomaston.	Torrington.	Warren.	Washington.	Watertown.	Winchester.	Woodbury.	TOTAL.
Cancer of Tongue	M.	8																											
Cancer and Other Malignant Tumors of Stomach and Liver—	M.	2																											
	F.	1																											
of Gall Bladder	M.	3																											
	F.	4																											
of Liver	M.	32																		1		1						1	3
	F.	38		1																					1				2
Œsophagus	M.	2																											
of Pancreas	M.	3																											
	F.	5																											
of Pylorus	M.	2																											
	F.	1																											
of Stomach	M.	96													2							1					2		5
	F.	79						1													1	1						1	4
Cancer and Oth. Malig. Tum. of Perit'm, Intes. and Rect.—	M.	1																											
	F.	4																											
of Colon	M.	1																											
	F.	7																											
of Intestines	M.	20																				1							1
	F.	34																									1		1
of Rectum	M.	10																											
	F.	22																											

Cancer of Sigmoid Flexure	M.	1																											
	F.	8																											
of Spleen	F.	1																											
of Peritoneum	F.	4																											
Cancer and Other Malig. Tumors of Fem. Genitals—																													
of Cervix	F.	6																											
of Ovary	F.	8					1																						1
of Uterus	F.	118							1					1	1								2			1	1	1	8
of Vagina	F.	1																											
of Vulva	F.	1																											
Cancer and Other Malig. Tumors of the Breast	F.	88		1											1			1					1						4
Cancer and Other Malig. Tumors of the Skin—	M.	8																			1								1
	F.	4																											
of Face	M.	14																					1						1
	F.	4																								1			1
Cancer and other Malignant Tumors of Other Organs and Organs not Specified—	M.	57	1																				1	1		2	2		7
	F.	51																	1								2		3
of Abdomen	M.	1																											
	F.	3																											
of Bladder	M.	8																										1	1
	F.	3																											
of Lungs	M.	2																											
	F.	1																											
of Pelvis	M.	3																								1			1
	F.	3																											
of Penis	M.	1																											
of Testicle	M.	2																											
Other Tumors (Tum. of Female Genitals exc.)	M.	3																											
	F.	2																											
a. Abdominal	M.	2																											
	F.	8													1														1
b. Intestinal	M.	1																											

TABLE VI—Continued. Litchfield County—1908.

CAUSES OF DEATH.		State.	Litchfield.	Barkhamsted.	Bethlehem.	Bridgewater.	Canaan.	Colebrook.	Cornwall.	Goshen.	Harwinton.	Kent.	Morris.	New Hartford.	New Milford.	Norfolk.	North Canaan.	Plymouth.	Roxbury.	Salisbury.	Sharon.	Thomaston.	Torrington.	Warren.	Washington.	Watertown.	Winchester.	Woodbury.	Total.
Rheumatism, Acute, Articular	M.	36																		1							1		2
	F.	49	1					1															1						3
Rheumatism, Chronic, and Gout	M.	13																									1		1
	F.	18											1			1											1	1	4
Scorbutus	M.	1																											
Diabetes	M.	72		1											1				1							1	1		5
	F.	104									1				2						1		3			1	2		10
Goiter, Exophthalmic	F.	7		1																									1
Addison's Disease	M.	4																											
	F.	1																											
Leukæmia	M.	2																											
	F.	1																											
a. Hodgkin's Disease	M.	4																											
Anæmia, Chlorosis	M.	4																											
	F.	5																											
a. Anæmia, Pernicious	M.	10																											
	F.	24																											
Other General Diseases	M.	2																											
	F.	2									1																		1
Alcoholism, Acute and Chronic	M.	49	2																				2					2	6
	F.	11																											
a. Delirium Tremens	M.	10							1																		1		2

Saturnism	M.	1																										
	F.	2																										
Other Chronic Poisonings	M.	4		1																								1
	F.	4																										
Total General Diseases		4133	13	9	1	1	3	2	4	..	5	1	2	3	20	4	3	13	8	25	7	11	43	2	7	22	42	13	264
CLASS II.—DISEASES OF THE NERVOUS SYSTEM AND ORGANS OF SPECIAL SENSE.																												
Encephalitis	F.	1																										
Meningitis, Simple	M.	94																				1						1
	F.	80														1	1		1			2				2		7
a. Epidemic Cerebro-spinal Meningitis	M.	1																										
b. Cerebro-spinal Meningitis	M.	23												1														1
	F.	33																	1			1				1		3
c. Lepto-Meningitis	M.	1																										
	F.	2																										
d. Spinal Meningitis	M.	14																										
	F.	14																										
Locomotor Ataxia, Progressive	M.	23																	1									1
	F.	4																										
Other Diseases of the Spinal Cord	M.	13																										
	F.	16																										
a. Lateral Sclerosis	M.	7																										
	F.	5																										
b. Muscular Atrophy	F.	1																										
c. Paralysis Agitans	M.	10							1																			1
	F.	5																										
Cerebral Congestion—Hemorrhage	M.	431	2	1	1	2		1	4	1					4	1	1		2	1	2	1	8			1	4	2	39
	F.	492	1					1				1		2	1	1	1	2			1	1	4		1	1	3	2	23
Cerebral Softening	M.	15												1							1						1		3
	F.	17																										1	1

TABLE VI—CONTINUED. LITCHFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Litchfield.	Barkhamsted.	Bethlehem.	Bridgewater.	Canaan.	Colebrook.	Cornwall.	Goshen.	Harwinton.	Kent.	Morris.	New Hartford.	New Milford.	Norfolk.	North Canaan.	Plymouth.	Roxbury.	Salisbury.	Sharon.	Thomaston.	Torrington.	Warren.	Washington.	Watertown.	Winchester.	Woodbury.	TOTAL.
Paralysis without Specified Cause	M.	43						1							1		1											1	4
	F.	38																											
a. Hemiplegia	M.	18																											
	F.	13																											
b. Paraplegia	F.	3																											
Paralysis, General	M.	40																											
	F.	18									1																		1
Other Forms of Mental Alienation	M.	10																											
	F.	26																					1					1	2
Epilepsy	M.	25																		3									3
	F.	34				1				1					1					2						1			6
Eclampsia (non-puerperal) (5 years and over)	M.	1																											
	F.	7																											
Convulsions of Children (under 5)	M.	71													1								3						4
	F.	58																1				1	2						4
Tetanus	M.	8																											
	F.	2																											
a. Trismus Nascentium	M.	7																					1						1
	F.	2																											
Chorea	F.	5																											
Other Diseases of the Nervous System	M.	7																											
	F.	13																									1		1
a. Organic Brain Disease	M.	1																											

b. Cerebral Anæmia	F.	1																										
c. Cerebral Tumor	M.	16																										
	F.	10																										
d. Labio-glosso-laryngeal Paralysis	M.	1																										
e. Neuralgia	F.	1																										
f. Neurasthenia	M.	1																										
	F.	4																										
g. Multiple Neuritis	F.	1																										
Diseases of the Eye and its Adnexa	M.	1																										
Diseases of the Ear—Otitis	M.	12														1												1
	F.	7																										
Total Diseases of Nervous System		1807	3	1	1	3		3	5	2	1	1		3	9	2	5	4	2	9	4	3	23		1	3	12	7	107
CLASS III.—DISEASES OF THE CIRCULATORY SYSTEM.																												
Pericarditis	M.	6																										
	F.	8																										
Endocarditis, Acute	M.	63											1												1		2
	F.	73											1														1
a. Myocarditis	M.	43																		1						2	3
	F.	40				1										1											1	3
Organic Diseases of the Heart	M.	442							1					2	1		1				1	1	3	1	2		4		17
	F.	464	1			1		1	1	1	1		1	1		1	1	2		1	1		1			2	7		24
a. Cardiac Asthma	M.	1																										
	F.	1																										
b. Fatty Degeneration	M.	24																					1						1
	F.	33					1		1							1													3
c. Valvular	M.	203															1			2	1		2						6
	F.	168			1									1											2		1		5
Angina Pectoris	M.	54																				1	1						2
	F.	32																1					1						2

TABLE VI—CONTINUED. LITCHFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Litchfield.	Barkhamsted.	Bethlehem.	Bridgewater.	Canaan.	Colebrook.	Cornwall.	Goshen.	Harwinton.	Kent.	Morris.	New Hartford.	New Milford.	Norfolk.	North Canaan.	Plymouth.	Roxbury.	Salisbury.	Sharon.	Thomaston.	Torrington.	Warren.	Washington.	Watertown.	Winchester.	Woodbury.	TOTAL.
Affec. of the Arteries (Atheroma, Aneurism, etc.)	M.	8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1
	F.	13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	1	--	--	--	--	--	3
a. Aneurism of the Aorta	M.	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
	F.	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
b. Arterio-Sclerosis	M.	142	1	--	--	--	--	--	--	1	1	--	--	1	1	--	1	1	--	2	--	--	1	--	2	1	2	--	15
	F.	91	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	1	--	--	--	1	--	--	--	--	--	--	4
c. Atheroma of Coronary Arteries	M.	7	1	--	--	--	--	--	--	--	1	--	--	--	1	--	--	--	--	--	--	--	--	--	1	--	--	--	4
	F.	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	--	--	--	2
Embolus and Thrombosis (non-puerperal)	M.	29	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
	F.	38	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
Aff. of Veins (Varices, Hemorrhoids, Phlebitis)	F.	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
Affec. of the Lymp. Sys. (Lymphangitis, etc.)	M.	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
	F.	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	1
Hemorrhages	F.	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
a. Purpura Hemorrhagica	M.	4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
	F.	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
Total of Circulatory System		1997	4	--	1	2	1	1	3	2	3	--	2	7	3	5	4	5	--	8	4	3	12	1	8	3	17	4	103
CLASS IV.—DISEASES OF THE RESPIRATORY SYSTEM.																													
Affections of the Larynx	M.	3	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1
	F.	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
a. Laryngitis	M.	8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
	F.	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----

b. Laryngismus Stridulus	M.	1																										
Affections of the Thyroid Body	F.	2																										
Bronchitis, Acute	M.	83	1					1															1					3
	F.	71							1												1	1						3
a. Capillary	M.	26																								1		1
	F.	22													1													1
Bronchitis Chronic	M.	66												1	1	2									1		3		8
	F.	74																		1									1
Broncho-Pneumonia	M.	161	1												1	1				1			3				1		8
	F.	148						1				1			2	1					1					1		2	9
Pneumonia	M.	524	1								2			2	5	1	1			1	1		8	1	3		2	1	29
	F.	495	2	1			1		1		1		1		2			3					10		1	2	1		26
a. Pleuro-Pneumonia	M.	17																											
	F.	25																	1			1							2
Pleurisy	M.	16																							1				1
	F.	17			1																								1
Pulmonary Congestion and Apoplexy	M.	18																	1										1
	F.	30																		1							1		2
Gangrene of the Lung	M.	1																											
Asthma	M.	8																							1				1
	F.	10																							1				1
Pulmonary Emphysema	M.	4																											
	F.	3														1													1
Other Dis. of Respiratory Appar. (Phthisis exc.)	M.	2																											
	F.	3																											
a. Abscess of the Lung	M.	5																											
	F.	4																											
b. Pulmonary Hemorrhage	M.	4																											
	F.	4																											
Total of Respiratory System		1858	5	1	1	..	1	2	2	..	3	1	1	3	13	6	1	3	2	4	2	2	22	2	8	3	9	3	100

TABLE VI—CONTINUED. LITCHFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Litchfield.	Barkhamsted.	Bethlehem.	Bridgewater.	Canaan.	Colebrook.	Cornwall.	Goshen.	Harwinton.	Kent.	Morris.	New Hartford.	New Milford.	Norfolk.	North Canaan.	Plymouth.	Roxbury.	Salisbury.	Sharon.	Thomaston.	Torrington.	Warren.	Washington.	Watertown.	Winchester.	Woodbury.	TOTAL.
CLASS V.—DISEASES OF THE DIGESTIVE APPARATUS.																													
Affections of the Mouth and its Adnexa	M.	2																											
	F.	6																					1						1
Affections of the Pharynx	M.	4																											
	F.	3																											
a. Quinsy	M.	1																											
	F.	1																											
b. Tonsilitis	M.	4																											
	F.	3																											
Affections of the Œsophagus	M.	4																											
	F.	2																											
Ulcer of the Stomach	M.	15																											
	F.	11																									1		1
Other Affect. of the Stomach (Cancer excepted)	M.	7																		1									1
	F.	6															1						1						2
a. Gastritis	M	37																	1				1						2
	F.	65																		1		1	1						3
b. Gastric Catarrh	M.	2																											
	F.	1																									1		1

c. Gastric Hemorrhage	M.	2																											
	F.	4																							1		1
d. Indigestion	M.	49													1	1	1						3						6
	F.	53																2	1		1		1						5
Diarrhœa and Enteritis (under 2 years)	M.	39								1								1					1						3
	F.	27																1					1						2
a. Colitis	M.	6																											
	F.	5																											
b. *Cholera Infantum*	M.	197							1		1				1			1					3				1		8
	F.	200																					3						3
c. Entero Colitis	M.	58															1					1	1						3
	F.	47																											
d. Enteritis	M.	43		1										1	1								1						4
	F.	45																					1						1
e. Gastro-Enteritis	M.	133																2											2
	F.	113												1				3					2						6
f. Diarrhœa	M.	39	1												1												1	1	4
	F.	37																					1						1
Diarrhœa and Enteritis (2 yrs. and over)	M.	17												1		1						1							3
	F.	17																											
a. Colitis	M.	2																											
	F.	8																					2						2
b. Diarrhœa	M.	14																					1						1
	F.	27					1																				2		3
c. Enteritis	M.	8																									1		1
	F.	17											1									1							2
d. Entero Colitis	M.	6																											
	F.	10																1											1
e. Gastro-Enteritis	M.	16																											
	F.	19													1													1	2
Hernias: Intestinal Obstructions—																													
a. Hernia	M.	21																									2		2
	F.	26																									1		1

TABLE VI—CONTINUED. LITCHFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Litchfield.	Barkhamsted.	Bethlehem.	Bridgewater.	Canaan.	Colebrook.	Cornwall.	Goshen.	Harwinton.	Kent.	Morris.	New Hartford.	New Milford.	Norfolk.	North Canaan.	Plymouth.	Roxbury.	Salisbury.	Sharon.	Thomaston.	Torrington.	Warren.	Washington.	Watertown.	Winchester.	Woodbury.	TOTAL.
b. Volvulus	M.	3																											
	F.	2																											
c. Intestinal Obstruction	M.	56		1														1					3			1			6
	F.	43																				1					1		2
Other Affections of Intestines	M.	18																										1	1
	F.	7																											
a. Intestinal Hemorrhage	M.	1																											
	F.	3																											
Acute Yellow Atrophy of Liver	F.	3																					1						1
Tumors, Hydatid, of the Liver	F.	2																											
Cirrhosis of the Liver	M.	85	4												1	1											1		7
	F.	33																									1		1
a. Hepatitis, interstitial or chronic	M.	2																											
	F.	6																											
b. Amyloid Degeneration of Liver	F.	1																											
c. Slow Atrophy of Liver	M.	1															1												1
	F.	1																											
Biliary Calculi	M.	4																											
	F.	17																											
Other Affections of the Liver	M.	17																		1									1
	F.	24	1						1						1														3
a. Abscess	M.	3																											
	F.	3																											
b. Tumor	F.	1																											

c. Hypertrophy	F.	1																										
d. Jaundice (3 mos. and over)	M.	3																										
	F.	4																										
e. Acute Hepatitis (3 mos. and over)	M.	3																										
	F.	1																										
Affections of the Spleen	M.	2																										
	F.	3																										
Peritonitis, Simple (Puerperal excepted)	M.	10																										
	F.	22																							1			1
Oth. Affec. of Diges. Appar. (Canc. and Tub. ex.)	M.	3																										
	F.	2																										
Appendicitis and Abscess of the Iliac Fossa—																												
a. Appendicitis	M.	49						1																				1
	F.	35	1																							1		2
Total of Digestive System		1953	7	2	..	..	1	1	2	1	1	..	1	3	7	3	4	12	2	3	1	5	29	..	..	2	15	3	105
CLASS VI—DISEASES OF THE GENITO-URINARY APPARATUS AND ITS ADNEXA.																												
Nephritis, Acute	M.	71											1								1					1		3
	F.	72											1	1							1	1						4
Bright's Disease	M.	482				1					2		1	3			1		4		1	5		4	2	6		30
	F.	370	5							1	1	1	1	1	1			1				3	3			3	4		25
a. Albuminuria	M.	2																										
	F.	2																										
b. Uræmia	M.	21																				1						1
	F.	18																		1								1
Other Diseases of the Kidneys and their Adnexa	M.	19																										
	F.	10																										
a. Myoma and Abscess of Kidney	F.	2																										
b. Congestion, renal	M.	1																										

TABLE VI—CONTINUED. LITCHFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Litchfield.	Barkhamsted.	Bethlehem.	Bridgewater.	Canaan.	Colebrook.	Cornwall.	Goshen.	Harwinton.	Kent.	Morris.	New Hartford.	New Milford.	Norfolk.	North Canaan.	Plymouth.	Roxbury.	Salisbury.	Sharon.	Thomaston.	Torrington.	Warren.	Washington.	Watertown.	Winchester.	Woodbury.	TOTAL.
Calculi of the Urinary Tract	M.	6																											
	F.	1																											
Diseases of the Bladder	M.	5																											
	F.	3																											
a. Cystitis	M.	56																1											1
	F.	2																											
b. Retention of Urine	M.	3																											
Diseases of the Urethra	M.	3																											
	F.	2																											
Diseases of the Prostate	M.	40			1		1							1			1									1	1		6
Non-venereal Diseases of Male Gen. Organs	M.	1																											
Hemorrhage, Uterine (non-puerperal)	F.	1																											
Tumor, Uterine (non-cancerous)	F.	21																											
Other Diseases of the Uterus	F.	4																										1	1
a. Pelvic Abscess	F.	6																											
Cysts, and Other Tumors of the Ovary	F.	13																											
Other Diseases of the Female Genital Organs	F.	4																											
a. Pyosalpinx	F.	7																											
b. Salpingitis	F.	3																											
Non-puerperal Diseases of the Breast (Cancer ex.)	F.	2																											
Total Genito-Urinary System		1253	5		1	1	1			1	1	3	1	5	5		1	3		4	1	6	10		4	6	12	1	72

CLASS VII.—THE PUERPERAL STATE.																													
Accidents of Pregnancy	F.	21													1								1						2
a. Abortion	F.	4																											
b. Tubal Pregnancy	F.	2																											
Hemorrhage, Puerperal	F.	10																					1						1
Other Accidents of Labor	F.	5																					1						1
a. Dystocia	F.	2																											
b. Placenta Previa	F.	7									1																		1
Septicæmia, Puerperal	F.	32									2																		2
Albuminuria and Puerperal Eclampsia	F.	30																											
Other Puerperal Accidents	F.	8																											
Total Diseases of the Puerperal State		121									3				1								3						7
CLASS VIII.—DISEASES OF THE SKIN AND CELLULAR TISSUE.																													
Gangrene	M.	25																			1		2			1			4
	F.	15																											
Furuncle (Carbuncle)	M.	3																		1									1
	F.	2																											
Abscess	M.	5																											
	F.	3																											
Other Diseases of Skin	M.	4																											
	F.	10																											
Total Dis. of Integumentary and Cellular Tissue		67																		1	1		2			1			5

TABLE VI—CONTINUED. LITCHFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Litchfield	Barkhamsted.	Bethlehem.	Bridgewater.	Canaan.	Colebrook.	Cornwall.	Goshen.	Harwinton.	Kent.	Morris.	New Hartford.	New Milford.	Norfolk.	North Canaan.	Plymouth.	Roxbury.	Salisbury.	Sharon.	Thomaston.	Torrington.	Warren.	Washington.	Watertown.	Winchester.	Woodbury.	TOTAL.
CLASS IX.—DISEASES OF THE ORGANS OF LOCOMOTION.																													
Affections of the Bones (non-tuberculous)	F.	4															1												1
a. Abscess, Mastoid	M.	7							1																				1
	F.	5																											
b. Rachitis	M.	9																				1							1
	F.	5																											
c. Osteo-Myelitis	M.	3																											
Arthritis, Oth. Affec. of Jts. (Tub. and Rhm. ex.)	M.	3																											
Total Organs of Locomotion		36							1								1					1							3
CLASS X.—MALFORMATIONS.																													
Malformations, Congenital (Stillbirths excepted)	M.	47									1			1				1					1	1			1		6
	F.	56														1						1	1	1					4
a. Hydrocephalus	M.	13																1					1				1		3
	F.	5																											
b. Cyanosis	M.	7												1															1
	F.	6																					1						1
c. Spina Bifida	M.	4																											
	F.	5																					1						1
d. Open Foramen Ovale	M.	14																											
	F.	7																											
e. Imperforate Anus	M.	2																											
Total Malformations		166									1			2		1		2				1	5	2			2		16

CLASS XI.—EARLY INFANCY.																													
Congenital Debility	M.	102	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	3	1	--	6
	F.	70	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1	--	2
a. Atelectasis	M.	17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	1	2
	F.	16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	1	--	--	2
b. Icterus Neonatorum	M.	21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	1
	F.	7	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	2	--	--	--	--	--	3
c. Premature Birth	M.	270	--	--	--	--	2	--	1	--	1	--	--	--	2	--	1	2	--	2	1	3	4	--	1	--	3	--	23
	F.	203	--	--	--	--	--	--	2	--	--	--	--	--	3	--	--	--	--	1	--	--	4	--	--	1	1	--	12
Other Diseases of Early Infancy	M.	28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
	F.	22	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	3
a. Umbilical Hemorrhage	M.	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
	F.	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
Inanition under 3 months	M.	70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	--	--	--	--	--	3
	F.	51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4	--	--	--	--	--	4
Total Early Infancy		888	--	--	--	--	2	1	3	--	2	--	--	1	6	--	1	2	--	3	2	5	20	--	1	5	6	1	61
CLASS XII.—OLD AGE.																													
Senile Debility	M.	124	--	--	--	2	1	--	--	--	--	1	--	--	--	--	--	--	--	--	1	--	--	--	--	1	3	1	10
	F.	180	--	--	--	1	--	--	--	--	--	--	--	1	1	--	--	--	--	--	1	--	2	--	1	2	4	--	13
Total Old Age		304	--	--	--	3	1	--	--	--	--	1	--	1	1	--	--	--	--	--	2	--	2	--	1	3	7	1	23
CLASS XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																													
Suicide by Poison	M.	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---
	F.	9	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	2

TABLE VI—CONTINUED. LITCHFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Litchfield.	Barkhamsted.	Bethlehem.	Bridgewater.	Canaan.	Colebrook.	Cornwall.	Goshen.	Harwinton.	Kent.	Morris.	New Hartford.	New Milford.	Norfolk.	North Canaan.	Plymouth.	Roxbury.	Salisbury.	Sharon.	Thomaston.	Torrington.	Warren.	Washington.	Watertown.	Winchester.	Woodbury.	TOTAL.
a. Narcotic Poison	M.	4															1												1
	F.	2																											
b. Carbolic Acid	M.	42																											
	F.	17													2														2
Suicide by Asphyxia	M.	1																											
a. Inhalation of Illuminating Gas	M.	15																					1						1
	F.	4																					1						1
Suicide by Hanging or Strangulation	M.	11					1						1																2
	F.	6																			1								1
Suicide by Drowning	M.	10																											
	F.	8																											
Suicide by Firearms	M.	42													1				1			1					1		4
	F.	3																											
Suicide by Cutting Instruments	M.	13																											
Suicide by Jumping from high places	M.	2																											
Other Suicides	M.	3																							1				1
Total Suicides		198					1						1		3	1	1	1	1		1	1	2		1		1		15
Fractures, not specified—																													
a. Arms and Legs	M.	2																											
b. Femur	M.	3																											
	F.	3																											

c. Hip	M.	5	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
	F.	8	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
d. Neck	M.	2	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
e. Ribs	M.	3	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1
f. Skull	M.	16	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
	F.	5	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
g. Vertebra	M.	7	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
	F.	1	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
Dislocations	M.	1	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
Other Accidental Traumatisms	M.	49	---	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	1
	F.	6	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	1
a. Cerebral Concussion	M.	4	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
	F.	1	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
b. Fall	M.	79	---	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	3	2	8
	F.	51	---	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	2
c. Fall from pole	M.	1	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
d. Fall from window	M.	7	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
	F.	1	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
e. Kick of Horse	M.	6	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
f. Live Electric Wire	M.	1	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
g. Railway, Steam	M.	148	1	--	--	--	--	--	--	--	--	--	--	--	--	1	1	1	--	--	--	--	--	--	--	--	--	--	4
	F.	11	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	1
h. Railway, Street	M.	24	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
	F.	4	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
i. Automobile, Accidents	M.	13	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
	F.	4	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
j. Injuries by Vehicle	M.	14	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
	F.	2	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	----
k. Gun Shot	M.	12	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	1

TABLE VI—CONTINUED. LITCHFIELD COUNTY—1908.

CAUSES OF DEATH.		STATE.	Litchfield.	Barkhamsted.	Bethlehem.	Bridgewater.	Canaan.	Colebrook.	Cornwall.	Goshen.	Harwinton.	Kent.	Morris.	New Hartford.	New Milford.	Norfolk.	North Canaan.	Plymouth.	Roxbury.	Salisbury.	Sharon.	Thomaston.	Torrington.	Warren.	Washington.	Watertown.	Winchester.	Woodbury.	TOTAL.
Burns and Scalds	M.	37																					1						1
	F.	47	1																					1					2
Heat and Sunstroke	M.	13																				1			1	1			3
	F.	8																											
Cold and Freezing	M.	5	1			1						1																	3
	F.	1																											
Electric Shock	M.	4																											
a. Lightning	M.	4																							1				1
	F.	1																											
Accidental Drowning	M.	126	1				1						1	1						2									6
	F.	16							1																				1
Starvation and Privation	F.	1																											
Absorption of Deleterious Gases (Suicide ex.)	M.	19																											
	F	1																											
Other Acute Poisonings	M.	28																		1									1
	F.	22																											
Other External Violence—																													
a. Suffocation	M.	15										1																	1
	F.	7																											
b. Injuries at birth	M.	80	2																			1	3						6
	F.	40																1					2						3

Capital Punishment—Execution	M.	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	---	--	----
Homicides	M.	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	----
	F.	9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	---	--	----
a. Gunshot	M.	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	---	--	----
	F.	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	---	--	----
b. Stab or Cut	M.	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	1	1	--	2
Total from Violence		1207	8	1	--	2	2	--	1	--	--	2	2	1	3	3	2	3	1	5	3	3	9	1	3	2	8	2	67
CLASS XIV.—ILL-DEFINED DISEASES.																													
Dropsy	M.	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	---	--	----
	F.	1	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	---	--	1
Inanition (over 3 months)	M.	9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	---	--	1
	F.	9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	---	--	----
Marasmus (over 3 months)	M.	57	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	1	---	--	--	--	---	--	2
	F.	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	---	--	----
Ill-defined	M.	30	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	1	--	--	--	---	--	1
	F.	19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	---	--	----
Causes unknown	M.	30	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--	--	--	--	--	---	--	--	1	---	--	3
	F.	13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	---	--	----
Total Unspecified Causes		210	--	--	--	--	1	--	--	--	--	--	--	--	3	--	--	--	--	--	--	1	2	--	--	1	---	--	8
GRAND TOTAL		16000	45	14	5	12	13	10	21	6	20	9	9	29	71	24	22	47	15	62	27	41	182	8	33	51	130	35	941

TABLE VI—Continued.

MIDDLESEX COUNTY—1908.

CAUSES OF DEATH.		STATE.	Middletown.	Haddam.	Chatham.	Chester.	Clinton.	Cromwell.	Durham.	East Haddam.	Essex.	Killingworth.	Middlefield.	Old Saybrook.	Portland.	Saybrook.	Westbrook.	TOTAL.
Nomenclature of Statistics of Death.																		
CLASS I.—GENERAL DISEASES.																		
Typhoid Fever	M.	126	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2
	F.	68	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3
Fever, Intermittent	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Malaria	M.	13	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	12	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	2
b. Remittent Fever	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	5	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
Measles	M.	46	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	42	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Scarlatina	M.	32	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	28	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Whooping Cough	M.	39	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
	F.	56	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Diphtheria—Membranous Croup	M.	100	4	2	....	....	....	....	....	....	....	....	....	....	2	....	....	8
	F.	94	4	....	....	....	....	1	....	....	....	....	....	....	....	....	....	5
Grippe—Influenza	M.	177	3	....	2	....	....	....	....	....	....	....	....	....	....	....	1	6
	F.	219	....	....	....	1	....	1	....	....	....	....	....	....	....	....	....	2
Cholera, Nostras	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	7	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Dysentery	M.	33	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2
	F.	50	1	....	....	....	1	....	....	....	2	....	....	....	....	....	1	5

Erysipelas	M.	21	2															2
	F.	21																
Other Epidemic Affections	F.	5																
Purulent Infection and Septicæmia	M.	21	1															1
	F.	8																
a. Pyæmia	M.	10																
	F.	4																
Rabies	M.	1																
Tubercle of Larynx	M.	8																
	F.	2																
Tubercle of Lungs	M.	802	25	1	1	1			1	1					3	1	1	35
	F.	589	24	2				1		1	1	1	1	1	1			33
Tubercle of Meninges	M.	52	1									1						2
	F.	37																
Tubercle, Abdominal	M.	30	4															4
	F.	21	1															1
Pott's Disease, Psoas Abscess	M.	5																
	F.	2																
Abscess, Cold and by Congestion	M.	3																
White Tumors (White Swellings)	M.	5												1				1
	F.	1																
Tubercle of Other Organs	M.	10														1		1
	F.	2																
Generalized Tubercle	M.	24													1			1
	F.	16	1															1
Scrofula	F.	2																
Syphilis	M.	15	1															1
	F.	12																
Gonorrhœal Infections of Children	M.	1																
Cancer and Other Malig. Tumors of Buc. Cavity	M.	1																
of Lips	M.	7																
of Maxilla	M.	7																
	F.	5																

TABLE VI—CONTINUED. MIDDLESEX COUNTY—1908.

CAUSES OF DEATH.		STATE.	Middletown.	Haddam.	Chatham.	Chester.	Clinton.	Cromwell.	Durham.	East Haddam.	Essex.	Killingworth.	Middlefield.	Old Saybrook.	Portland.	Saybrook.	Westbrook.	TOTAL.
Cancer of Tongue	M.	8																
Cancer and Other Malignant Tumors of Stomach and Liver—	M.	2																
	F.	1																
of Gall Bladder	M.	3																
	F.	4																
of Liver	M.	32																
	F.	38	2							1								3
Œsophagus	M.	2																
of Pancreas	M.	3																
	F.	5				1												1
of Pylorus	M.	2			1													1
	F.	1																
of Stomach	M.	96	4	1														5
	F.	79	1	1	1			1			1							5
Can. and Oth. Malig. Tum. of Perit'm, Intes. and Rect.—	M.	1																
	F.	4																
of Colon	M.	1																
	F.	7														1		1
of Intestines	M.	20			1					1								2
	F.	34	1							1					1			3
of Rectum	M.	10					1											1
	F.	22																

Cancer of Sigmoid Flexure	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Spleen	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Peritoneum	F.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	1
Can. and Other Malig. Tum. of the Female Genitals—																		
of Cervix	F.	6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Ovary	F.	8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Uterus	F.	118	5	----	----	----	----	----	----	----	----	----	----	1	----	----	----	6
of Vagina	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Vulva	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cancer and Other Malig. Tumors of the Breast	F.	88	3	----	1	----	1	1	----	----	----	----	----	----	----	----	----	6
Cancer and Other Malig. Tum. of the Skin	M.	8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	4	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
of Face	M.	14	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
	F.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cancer and Other Malignant Tumors of Other Organs and Organs not Specified	M.	57	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1	1
	F.	51	----	----	----	----	----	1	----	----	----	----	----	----	----	----	----	1
of Abdomen	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Bladder	M.	8	1	----	----	----	----	----	----	----	----	----	----	1	----	----	----	2
	F.	3	----	----	----	1	----	----	----	----	----	----	----	----	----	----	----	1
of Lungs	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Pelvis	M.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Penis	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
of Testicle	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Other Tumors (Tum. of Female Genitals exc.)	M.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
a. Abdominal	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	8	----	----	----	----	----	----	----	1	----	----	----	----	----	----	----	1
b. Intestinal	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

TABLE VI—CONTINUED. MIDDLESEX COUNTY—1908.

CAUSES OF DEATH.		STATE.	Middletown.	Haddam.	Chatham.	Chester.	Clinton.	Cromwell.	Durham.	East Haddam.	Essex.	Killingworth.	Middlefield.	Old Saybrook.	Portland.	Saybrook.	Westbrook.	TOTAL.
Rheumatism, Acute, Articular	M.	36	1												1			2
	F.	49														1		1
Rheumatism, Chronic, and Gout	M.	13																
	F.	18	1			1												2
Scorbutus	M.	1																
Diabetes	M.	72	3			1		1		1	1							7
	F.	104	1			1			1				1		1			5
Goiter, Exophthalmic	F.	7	1															1
Addison's Disease	M.	4									1							1
	F.	1																
Leukæmia	M.	2																
	F.	1																
a. Hodgkin's Disease	M.	4																
Anæmia, Chlorosis	M.	4																
	F.	5																
a. Anæmia, Pernicious	M.	10																
	F.	24																
Other General Diseases	M.	2																
	F.	2																
Alcoholism, Acute and Chronic	M.	49	1								1							2
	F.	11																
a. Delirium Tremens	M.	10																

Saturnism	M.	1																
	F.	2																
Other Chronic Poisonings	M.	4																
	F.	4																
Total General Diseases		4133	108	8	7	7	3	9	2	7	7	2	2	4	10	5	4	185
CLASS II.—DISEASES OF THE NERVOUS SYSTEM AND ORGANS OF SPECIAL SENSE.																		
Encephalitis	F.	1																
Meningitis, Simple	M.	94		1					1						1			3
	F.	80	1															1
a. Epidemic Cerebro-spinal Meningitis	M.	1																
b. Cerebro-spinal Meningitis	M.	23	1															1
	F.	33	1											1				2
c. Lepto-Meningitis	M.	1																
	F.	2																
d. Spinal Meningitis	M.	14													2			2
	F.	14	1															1
Locomotor Ataxia, Progressive	M.	23																
	F.	4																
Other Diseases of the Spinal Cord	M.	13																
	F.	16																
a. Lateral Sclerosis	M.	7																
	F.	5	1															1
b. Muscular Atrophy	F.	1																
c. Paralysis Agitans	M.	10	1															1
	F.	5																
Cerebral Congestion—Hemorrhage	M.	431	14	1			1		2	5	1				2		3	29
	F.	492	15	1			1	1	2	3	2	2		3	1		3	34
Cerebral Softening	M.	15																
	F.	17																

TABLE VI—CONTINUED. MIDDLESEX COUNTY—1908.

CAUSES OF DEATH.		STATE.	Middletown.	Haddam.	Chatham.	Chester.	Clinton.	Cromwell.	Durham.	East Haddam.	Essex.	Killingworth.	Middlefield.	Old Saybrook.	Portland.	Saybrook.	Westbrook.	TOTAL.
Paralysis without Specified Cause	M.	43	----	----	----	----	----	----	----	----	----	----	----	----	2	----	----	2
	F.	38	----	----	----	----	----	----	----	----	----	----	1	----	----	----	----	1
a. Hemiplegia	M.	18	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	13	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
b. Paraplegia	F.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Paralysis, General	M.	40	16	----	----	----	----	----	----	----	----	----	----	----	----	----	----	16
	F.	18	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2
Other Forms of Mental Alienation	M.	10	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	4
	F.	26	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	4
Epilepsy	M.	25	2	----	----	----	----	----	----	----	1	----	----	----	----	----	----	3
	F.	34	11	----	----	----	----	----	----	----	----	----	----	----	----	----	----	11
Eclampsia (non-puerperal) (5 years and over)	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Convulsions of Children (under 5)	M.	71	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2
	F.	58	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	1
Tetanus	M.	8	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
	F.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
a. Trismus Nascentium	M.	7	1	----	----	----	----	----	----	----	----	----	----	----	1	----	----	2
	F.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Chorea	F.	5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Other Diseases of the Nervous System	M.	7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	13	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
a. Organic Brain Disease	M.	1	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1

b. Cerebral Anæmia	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
c. Cerebral Tumor	M.	16	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
d. Labio-glosso-laryngeal Paralysis	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
e. Neuralgia	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
f. Neurasthenia	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
g. Multiple Neuritis	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Diseases of the Eye and its Adnexa	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Diseases of the Ear—Otitis	M.	12	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total Diseases of Nervous System		1807	79	3	....	....	2	1	5	8	4	2	1	4	10	....	6	125
CLASS III.—DISEASES OF THE CIRCULATORY SYSTEM.																		
Pericarditis	M.	6	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	F.	8	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	2
Endocarditis, Acute	M.	63	1	....	....	....	....	....	....	....	3	....	....	....	1	....	....	5
	F.	73	3	....	....	....	....	....	....	....	3	....	....	....	....	....	....	6
a. Myocarditis	M.	43	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
	F.	40	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Organic Diseases of the Heart	M.	442	10	....	2	....	1	....	....	1	....	....	....	....	4	1	....	19
	F.	454	14	2	1	....	....	1	....	....	1	1	....	....	....	1	1	22
a. Cardiac Asthma	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Fatty Degeneration	M.	24	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	2
	F.	33	2	....	1	....	....	....	....	....	....	....	....	....	....	....	....	3
c. Valvular	M.	203	32	....	....	....	....	1	....	3	....	....	....	....	1	....	....	37
	F.	168	24	....	....	....	....	....	1	....	....	....	....	....	....	....	....	25
Angina Pectoris	M.	54	4	....	....	....	....	....	....	....	1	....	....	....	....	....	....	5
	F.	32	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2

TABLE VI—CONTINUED. MIDDLESEX COUNTY—1908.

CAUSES OF DEATH.		STATE.	Middletown.	Haddam.	Chatham.	Chester.	Clinton.	Cromwell.	Durham.	East Haddam.	Essex.	Killingworth.	Middlefield.	Old Saybrook.	Portland.	Saybrook.	Westbrook.	TOTAL.
Affec. of the Arteries (Atheroma, Aneurism, etc.)	M.	8	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
	F.	13	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1
a. Aneurism of the Aorta	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Arterio-Sclerosis	M.	142	4	....	....	....	....	....	....	....	....	....	....	1	....	....	....	5
	F.	91	7	....	1	....	....	....	....	1	....	....	1	....	....	....	....	10
c. Atheroma of Coronary Arteries	M.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Embolus and Thrombosis (non-puerperal)	M.	29	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	2
	F.	38	3	....	....	1	....	....	....	....	....	....	....	....	....	....	....	4
Aff. of Veins (Varices, Hemorrhoids, Phlebitis)	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Affec. of the Lymp. Sys. (Lymphangitis, etc.)	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Hemorrhages	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Purpura Hemorrhagica	M.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total of Circulatory System		1997	108	3	5	2	1	3	2	5	8	1	2	2	8	2	2	154
CLASS IV.—DISEASES OF THE RESPIRATORY SYSTEM.																		
Affections of the Larynx	M.	3	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Laryngitis	M.	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

b. *Laryngismus Stridulus*	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Affections of the Thyroid Body	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2
Bronchitis, Acute	M.	83	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
	F.	71	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1
a. Capillary	M.	26	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....
	F.	22	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bronchitis, Chronic	M.	66	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
	F.	74	3	....	....	....	....	1	....	1	....	....	....	....	....	....	....	5
Broncho-Pneumonia	M.	171	9	1	1	....	....	....	....	....	....	....	....	....	....	....	....	11
	F.	148	8	....	....	....	....	....	....	1	2	....	....	....	....	....	....	11
Pneumonia	M.	524	5	....	3	....	....	....	....	1	1	....	....	....	1	....	....	11
	F.	495	7	....	....	1	....	....	1	1	....	....	....	....	....	....	1	11
a. Pleuro-Pneumonia	M.	17	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pleurisy	M.	16	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
	F.	17	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pulmonary Congestion and Apoplexy	M.	18	1	....	....	....	....	....	....	....	....	....	....	....	1	1	....	3
	F.	30	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3
Gangrene of the Lung	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Asthma	M.	8	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1
	F.	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pulmonary Emphysema	M.	4	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
	F.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Other Dis. of Respiratory Appar. (Phthisis exc.)	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Abscess of the Lung	M.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Pulmonary Hemorrhage	M.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total of Respiratory System		1858	41	3	4	1	....	2	1	5	3	....	....	....	2	1	1	64

TABLE VI—CONTINUED. MIDDLESEX COUNTY—1908.

CAUSES OF DEATH.		STATE.	Middletown.	Haddam.	Chatham.	Chester.	Clinton.	Cromwell.	Durham.	East Haddam.	Essex.	Killingworth.	Middlefield.	Old Saybrook.	Portland.	Saybrook.	Westbrook.	TOTAL.
CLASS V.—DISEASES OF THE DIGESTIVE APPARATUS.																		
Affections of the Mouth and its Adnexa	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Affections of the Pharynx	M.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
a. Quinsy	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	[illegible]	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
b. Tonsilitis	M.	4	----	----	----	----	----	1	----	----	----	----	----	----	----	----	----	1
	F.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Affections of the Œsophagus	M.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	2	----	----	----	----	----	----	----	1	----	----	----	----	----	----	----	1
Ulcer of the Stomach	M.	15	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	11	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Other Affect. of the Stomach (Cancer excepted)	M.	7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
a. Gastritis	M.	37	----	----	----	----	----	----	----	----	----	----	----	1	1	----	----	2
	F.	65	1	----	----	----	1	----	----	----	----	----	----	----	----	----	----	2
b. Gastric Catarrh	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

c. Gastric Hemorrhage	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
d. Indigestion	M.	49	----	1	1	----	----	----	----	----	----	----	----	1	----	----	----	3
	F.	53	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
Diarrhœa and Enteritis (under 2 years)	M.	39	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	27	----	----	----	----	----	----	----	----	1	----	----	----	----	----	----	1
a. Colitis	M.	6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
b. Cholera Infantum	M.	197	4	----	1	----	----	1	----	----	----	1	1	----	2	----	----	10
	F.	200	8	1	----	----	----	----	----	----	----	----	2	----	----	----	----	11
c. Entero Colitis	M.	58	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
	F.	47	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
d. Enteritis	M.	43	2	----	----	----	----	----	----	----	----	----	----	----	1	----	----	3
	F.	45	5	----	----	----	----	2	----	----	----	----	----	----	----	----	----	7
e. Gastro-Enteritis	M.	133	3	3	----	----	----	----	----	2	1	----	----	----	----	----	----	9
	F.	113	1	----	----	----	----	----	----	----	----	----	1	----	1	1	----	4
f. Diarrhœa	M.	39	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
	F.	37	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Diarrhœa and Enteritis (2 yrs. and over)	M.	17	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	1
	F.	17	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	1
a. Colitis	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
b. Diarrhœa	M.	14	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	27	----	----	1	----	----	----	----	----	----	----	----	1	----	----	----	2
c. Enteritis	M.	8	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	17	----	----	----	----	----	----	----	----	----	----	1	----	----	1	----	2
d. Entero Colitis	M.	6	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
	F.	10	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2
e. Gastro-Enteritis	M.	16	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	19	----	----	----	----	----	1	----	----	----	----	----	----	----	----	----	1
Hernias: Intestinal Obstructions—																		
b. Hernia	M.	21	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	26	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1

TABLE VI—CONTINUED. MIDDLESEX COUNTY—1908.

CAUSES OF DEATH.		STATE.	Middletown.	Haddam.	Chatham.	Chester.	Clinton.	Cromwell.	Durham.	East Haddam.	Essex.	Killingworth.	Middlefield.	Old Saybrook.	Portland.	Saybrook.	Westbrook.	TOTAL.
b. Volvulus	M.	3																
	F.	2																
c. Intestinal Obstruction	M.	56	1															1
	F.	43						1										1
Other Affections of Intestines	M.	18																
	F.	7						1										1
a. Intestinal Hemorrhage	M.	1																
	F.	3																
Yellow Atrophy of Liver	F.	3																
Tumors, Hydatid, of the Liver	F.	2																
Cirrhosis of the Liver	M.	85	1											1				2
	F.	33	2		1													3
a Hepatitis, interstitial or chronic	M.	2																
	F.	6																
b. Amyloid Degeneration of Liver	F.	1																
c. Slow atrophy of Liver	M.	1																
	F.	1																
Biliary Calculi	M.	4																
	F.	17								2								2
Other Affections of the Liver	M.	17																
	F.	24	1															1
a. Abscess	M.	3																
	F.	3																
b. Tumor	F.	1																

c. Hypertrophy	F.	1	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
d. Jaundice (3 mos. and over)	M.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
e. Acute Hepatitis (3 mos. and over)	M.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Affections of the Spleen	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Peritonitis, Simple (Puerperal excepted)	M.	10	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
	F.	22	1	----	----	----	----	----	----	1	----	----	----	----	----	----	----	2
Oth. Affec. of Diges. Appar. (Canc. and Tub. ex.)	M.	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Appendicitis and Abscess of the Iliac Fossa—																		
a. Appendicitis	M.	49	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	35	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
Total of Digestive System		1953	41	7	4	----	1	7	----	6	2	1	5	4	5	2	----	85
CLASS VI.—DISEASES OF THE GENITO-URINARY APPARATUS AND ITS ADNEXA.																		
Nephritis, Acute	M.	71	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
	F.	72	1	----	----	----	----	----	----	----	1	----	----	----	1	----	----	3
Bright's Disease	M.	482	5	----	----	1	1	----	----	1	1	----	----	1	3	----	1	14
	F.	370	8	----	1	----	----	1	----	1	----	----	----	----	1	2	----	14
a. Albuminuria	M.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
b. Uræmia	M.	21	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1	1
	F.	18	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	1
Other Diseases of the Kidneys and their Adnexa	M.	19	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	10	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
a. Myoma and Abscess of Kidney	F.	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
b. Congestion, renal	M.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

TABLE VI—CONTINUED. MIDDLESEX COUNTY—1908.

CAUSES OF DEATH.		STATE.	Middletown.	Haddam.	Chatham.	Chester.	Clinton.	Cromwell.	Durham.	East Haddam.	Essex.	Killingworth.	Middlefield.	Old Saybrook.	Portland.	Saybrook.	Westbrook.	TOTAL.
Calculi of the Urinary Tract	M.	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1
	F.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Diseases of the Bladder	M.	5	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	2
	F.	3	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2
a. Cystitis	M.	56	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Retention of Urine	M.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Diseases of the Urethra	M	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Diseases of the Prostate	M.	40	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1
Non-venereal Diseases of Male Genital Organs	M.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hemorrhage, Uterine (non-puerperal)	F.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tumor, Uterine (non-cancerous)	F.	21	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Other Diseases of the Uterus	F.	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
a. Pelvic Abscess	F.	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cysts, and other Tumors of the Ovary	F.	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Other Diseases of the Female Genital Organs	F.	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
a. Pyosalpinx	F.	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
b. Salpingitis	F.	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Non-puerperal Diseases of the Breast (Cancer ex.)	F.	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total Genito-Urinary System		1253	18	...	1	1	1	1	...	2	2	...	1	1	6	3	4	41

CLASS VII.—THE PUERPERAL STATE.

Accidents of Pregnancy	F.	21				1												1
a. Abortion	F.	4																
b. Tubal Pregnancy	F.	2																
Hemorrhage, Puerperal	F.	10																
Other Accidents of Labor	F.	5																
a. Dystocia	F.	2																
b. Placenta Previa	F.	7																
Septicæmia, Puerperal	F.	32	1					1		1								3
Albuminuria and Puerperal Eclampsia	F.	30	1															1
Other Puerperal Accidents	F.	8																
Total Diseases of the Puerperal State		121	2			1		1		1								5

CLASS VIII.—DISEASES OF THE SKIN AND CELLULAR TISSUE.

Gangrene	M.	25																
	F.	15												2				2
Furuncle (Carbuncle)	M.	3																
	F.	2																
Abscess	M.	5																
	F.	3																
Other Diseases of Skin	M.	4																
	F.	10		1														1
Total Dis. of Integumentary and Cellular Tissue		67		1										2				3

TABLE VI—Continued. Middlesex County—1908.

CAUSES OF DEATH.		State.	Middletown.	Haddam.	Chatham.	Chester.	Clinton.	Cromwell.	Durham.	East Haddam.	Essex.	Killingworth.	Middlefield.	Old Saybrook.	Portland.	Saybrook.	Westbrook.	Total.
Class IX.—Diseases of the Organs of Locomotion.																		
Affections of the Bones (non-tuberculous)	F.	4																
a. Abscess, Mastoid	M.	7																
	F.	5																
b. Rachitis	M.	9	1															1
	F.	5																
c. Osteo-Myelitis	M.	3																
Arthritis, Oth. Affec. of Jts. (Tub. and Rhm. ex.)	M.	3																
Total Organs of Locomotion		36	1															1
Class X.—Malformations.																		
Malformations, Congenital (Stillbirths excepted)	M.	47	1												1			2
	F.	56		1												1	1	3
a. Hydrocephalus	M.	13																
	F.	5																
b. Cyanosis	M.	7																
	F.	6																
c. Spina Bifida	M.	4																
	F.	5																
d. Open Foramen Ovale	M.	14	1	1														2
	F.	7																
e. Imperforate Anus	M.	2		1														1

CLASS XI.—EARLY INFANCY.																		
Congenital Debility	M.	102	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	2
	F.	70	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
a. Atelectasis	M.	17	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	16	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Icterus Neonatorum	M.	21	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
c. Premature Birth	M.	270	5	1	1	....	....	....	....	....	2	....	....	....	1	1	....	11
	F.	203	2	1	....	....	....	....	....	1	1	....	....	....	....	....	....	5
Other Diseases of Early Infancy	M.	28	2	....	....	....	....	....	....	....	....	....	1	....	....	....	....	3
	F.	22	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1
a. Umbilical Hemorrhage	M.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Inanition under 3 months	M.	70	....	....	1	....	....	....	....	1	....	....	....	....	....	....	....	2
	F.	51	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total Early Infancy		888	10	2	2	....	1	....	1	2	3	....	1	1	1	1	....	25
CLASS XII.—OLD AGE.																		
Senile Debility	M.	124	3	....	1	....	....	....	....	....	1	....	....	....	....	2	....	7
	F.	180	2	1	1	....	....	....	....	....	....	....	....	1	2	....	1	8
Total Old Age		304	5	1	2	....	....	....	....	....	1	....	....	1	2	2	1	15
CLASS XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																		
Suicide by Poison	M.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

TABLE VI—CONTINUED. MIDDLESEX COUNTY—1908.

CAUSES OF DEATH.		STATE.	Middletown.	Haddam.	Chatham.	Chester.	Clinton.	Cromwell.	Durham.	East Haddam.	Essex.	Killingworth.	Middlefield.	Old Saybrook.	Portland.	Saybrook.	Westbrook.	TOTAL.
a. Narcotic Poison	M.	4																
	F.	2						1										1
b. Carbolic Acid	M.	42	1			1												2
	F.	17																
Suicide by Asphyxia	M.	1																
a. Inhalation of Illuminating Gas	M.	15																
	F.	4	1															1
Suicide by Hanging or Strangulation	M.	11																
	F.	6																
Suicide by Drowning	M.	10		1														1
	F.	8									1						1	2
Suicide by Firearms	M.	42																
	F.	3																
Suicide by Cutting Instruments	M.	13																
Suicide by Jumping from high places	M.	2																
Other Suicides	M.	3																
Total Suicides		198	2	1		1		1			1						1	7
Fractures, not specified—																		
a. Arms and Legs	M.	2																
b. Femur	M.	3																
	F.	3	1															1

c. Hip	M.	5																
	F.	8																
d. Neck	M.	2																
e. Ribs	M.	3																
f. Skull	M.	16																
	F.	5																
g. Vertebra	M.	7																
	F.	1																
Dislocations	M.	1																
Other Accidental Traumatisms	M.	49													1			1
	F.	6																
a. Cerebral Concussion	M	4																
	F.	1																
b. Fall	M.	79	1				1	1			1							4
	F.	51	1	1												1		3
c. Fall from pole	M.	1																
d. Fall from window	M.	7																
	F.	1																
e. Kick of Horse	M.	6																
f. Live Electric Wire	M.	1																
g. Railway, Steam	M.	148	2													1		3
	F.	11																
h. Railway, Street	M.	24																
	F.	4																
i Automobile, Accidents	M.	13																
	F.	4																
j. Injuries by Vehicle	M.	14	1															1
	F.	2																
k. Gun Shot	M.	12	1															1

TABLE VI—CONTINUED. MIDDLESEX COUNTY—1908.

CAUSES OF DEATH.		STATE.	Middletown.	Haddam.	Chatham.	Chester.	Clinton.	Cromwell.	Durham.	East Haddam.	Essex.	Killingworth.	Middlefield.	Old Saybrook.	Portland.	Saybrook.	Westbrook.	TOTAL.
Burns and Scalds	M.	37	----	----	----	----	----	----	----	----	----	----	----	----	1	1	----	2
	F.	47	1	----	----	----	1	----	----	----	----	----	----	----	1	----	----	3
Heat and Sunstroke	M.	13	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	1
	F.	8	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
Cold and Freezing	M.	5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Electric Shock	M.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
a. Lightning	M.	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Accidental Drowning	M.	126	7	----	----	1	----	1	----	1	----	----	----	----	1	----	1	12
	F.	16	----	----	1	----	----	----	----	1	----	----	----	----	----	----	----	2
Starvation and Privation	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Absorption of Deleterious Gases (Suicide ex.)	M.	19	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Other Acute Poisonings	M.	28	----	----	----	1	----	----	----	1	----	----	----	----	----	----	----	2
	F.	22	1	----	----	1	----	----	----	----	----	----	----	----	----	----	----	2
Other External Violence—																		
a. Suffocation	M.	15	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	F.	7	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
b. Injuries at birth	M.	80	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
	F.	40	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Capital Punishment—Execution	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Homicides	M.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Gunshot	M.	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Stab or Cut	M.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total from Violence		1207	20	2	1	4	2	3	....	3	2	....	....	....	5	3	2	47
CLASS XIV.—ILL-DEFINED DISEASES.																		
Dropsy	M.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Inanition (over 3 months)	M.	9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Marasmus (over 3 months)	M.	57	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	F.	36	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ill-defined	M.	30	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	19	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
Causes unknown	M.	30	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	13	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	2
Total Unspecified Causes		210	1	1	....	1	....	....	1	....	....	....	....	....	....	....	....	4
GRAND TOTAL		16000	436	34	26	17	11	27	12	39	32	6	12	17	52	20	21	762

TABLE VI.—Continued.

TOLLAND COUNTY—1908.

CAUSES OF DEATH.		STATE.	Tolland.	Andover.	Bolton.	Columbia.	Coventry.	Ellington.	Hebron.	Mansfield.	Somers.	Stafford.	Union.	Vernon.	Willington.	TOTAL.
Nomenclature of Statistics of Death.																
CLASS I.—GENERAL DISEASES.																
Typhoid Fever	M.	126			1							1				2
	F.	68						1		1		1				3
Fever, intermittent	M.	2														
	F.	2														
a. Malaria	M.	13														
	F.	12										1				1
b. Remittent Fever	M.	2														
	F.	5														
Measles	M.	46														
	F.	42	1			1										2
Scarlatina	M.	32														
	F.	28		1												1
Whooping Cough	M.	39					1									1
	F.	56														
Diphtheria—Membranous Croup	M.	100												2		2
	F.	94							2	1				1		4
Grippe—Influenza	M.	177				1	3	2		2		1		2		11
	F.	219					3				1	2		5		11
Cholera, Nostras	M.	3									1					1
	F.	7												1		1
Dysentery	M.	33														
	F.	50			1				1							2

Erysipelas	M.	21														
	F.	21														
Other Epidemic Affections	F.	5														
Purulent Infection and Septicæmia	M.	21														
	F.	8														
a. Pyæmia	M.	10										1				1
	F.	4														
Rabies	M.	1														
Tubercle of Larynx	M.	8								1						1
	F.	2														
Tubercle of Lungs	M.	802	1				2		1		1	1		7	1	14
	F.	589		1							2	3		1	1	8
Tubercle of Meninges	M.	52										1				1
	F.	37														
Tubercle, Abdominal	M.	30														
	F.	21														
Pott's Disease, Psoas Abscess	M.	5														
	F.	2														
Abscess, Cold and by Congestion	M.	3														
White Tumors (White Swellings)	M.	5														
	F.	1														
Tubercle of Other Organs	M.	10														
	F.	2														
Generalized Tubercle	M.	24														
	F.	16														
Scrofula	F.	2														
Syphilis	M.	15														
	F.	12														
Gonorrheal Infections of Children	M.	1														
Cancer and Other Malig. Tumors of Buc. Cavity	M.	1														
of Lips	M.	7														
of Maxilla	M.	7														
	F.	5														

TABLE VI—CONTINUED. TOLLAND COUNTY—1908.

CAUSES OF DEATH.		STATE.	Tolland.	Andover.	Bolton.	Columbia.	Coventry.	Ellington.	Hebron.	Mansfield.	Somers.	Stafford.	Union.	Vernon.	Willington.	TOTAL.
Cancer of Tongue	M.	8														
Cancer and Other Malignant Tumors of Stomach and Liver—	M.	2														
	F.	1														
of Gall Bladder	M.	3														
	F.	4														
of Liver	M.	32			1									1		2
	F.	38										1				1
Œsophagus	M.	2														
of Pancreas	M.	3														
	F.	5														
of Pylorus	M.	2														
	F.	1										1				1
of Stomach	M.	96					1		1							2
	F.	79								1		1		1		3
Cancer and Oth. Malig. Tum. of Perit'm, Intes. and Rect.—	M.	1														
	F.	4														
of Colon	M.	1														
	F.	7												1		1
of Intestines	M.	20														
	F.	34														
of Rectum	M.	10														
	F.	22						1								1

Cancer of Sigmoid Flexure	M.	1														
	F.	3														
of Spleen	F.	1														
of Peritoneum	F.	4														
Can. and Other Malig. Tum. of the Female Genitals—																
of Cervix	F.	6														
of Ovary	F.	8														
of Uterus	F.	118			1							1		1		3
of Vagina	F.	1														
of Vulva	F.	1														
Cancer and Other Malig. Tumors of the Breast	F.	88	1						1						1	3
Cancer and Other Malig. Tumors of the Skin	M.	8														
	F.	4														
of Face	M.	14														
	F.	4														
Cancer and Other Malignant Tumors of Other Organs and Organs not Specified	M.	57														
	F.	51														
of Abdomen	M.	1														
	F.	3					1									1
of Bladder	M.	8										1				1
	F.	3														
of Lungs	M.	2														
	F.	1														
of Pelvis	M.	3														
	F.	3														
of Penis	M.	1												1		1
of Testicle	M.	2														
Other Tumors (Tum. of Female Genitals exc.)	M.	3														
	F.	2														
a. Abdominal	M.	2														
	F.	8														
b. Intestinal	M.	1														

TABLE VI—CONTINUED. TOLLAND COUNTY—1908.

CAUSES OF DEATH.		STATE.	Tolland.	Andover.	Bolton.	Columbia.	Coventry.	Ellington.	Hebron.	Mansfield.	Somers.	Stafford.	Union.	Vernon.	Willington.	TOTAL.
Rheumatism, Acute, Articular	M.	36	....	....	....	....	1	....	....	....	....	....	....	....	....	1
	F.	49	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Rheumatism, Chronic, and Gout	M.	13	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	18	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Scorbutus	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Diabetes	M.	72	....	....	....	....	....	....	1	....	....	....	....	1	....	2
	F.	104	....	....	....	....	....	....	....	....	....	....	....	1	....	1
Goiter, Exophthalmic	F.	7	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Addison's Disease	M.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Leukæmia	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	1	1
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Hodgkin's Disease	M.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Anæmia, Chlorosis	M.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Anæmia, Pernicious	M.	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	24	....	....	....	....	....	....	....	....	....	....	....	1	1	2
Other General Diseases	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Alcoholism, Acute and Chronic	M.	49	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	11	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Delirium Tremens	M.	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....

Saturnism	M.	1														
	F.	2														
Other Chronic Poisonings	M.	4														
	F.	4														
Total General Diseases		4133	3	2	4	2	12	6	7	5	6	16	1	27	5	96
CLASS II.—DISEASES OF THE NERVOUS SYSTEM AND ORGANS OF SPECIAL SENSE.																
Encephalitis	F.	1														
Meningitis, Simple	M.	94														
	F.	80	1													1
a. Epidemic Cerebro-spinal Meningitis	M.	1														
b. Cerebro-spinal Meningitis	M.	23													1	1
	F.	33														
c. Lepto-Meningitis	M.	1														
	F.	2														
d. Spinal Meningitis	M.	14														
	F.	14														
Locomotor Ataxia, Progressive	M.	23					1	1								2
	F.	4	1													1
Other Diseases of the Spinal Cord	M.	13											1			1
	F.	16														
a. Lateral Sclerosis	M.	7														
	F.	5														
b. Muscular Atrophy	F.	1														
c. Paralysis Agitans	M.	10														
	F.	5														
Cerebral Congestion—Hemorrhage	M.	431						2		1		1		5		9
	F.	492					1	2		1	3	3		6		16
Cerebral Softening	M.	15														
	F.	17														

TABLE VI—CONTINUED. TOLLAND COUNTY—1908.

CAUSES OF DEATH.		STATE.	Tolland.	Andover.	Bolton.	Columbia.	Coventry.	Ellington.	Hebron.	Mansfield.	Somers.	Stafford.	Union.	Vernon.	Willington.	TOTAL.
Paralysis without Specified Cause	M.	43										1				1
	F.	38														
a. Hemiplegia	M.	18														
	F.	13														
b. Paraplegia	F.	3														
Paralysis, General	M.	40														
	F.	18														
Other Forms of Mental Alienation	M.	10														
	F.	26										1				1
Epilepsy	M.	25														
	F.	34														
Eclampsia (non-puerperal) (5 years and over)	M.	1														
	F.	7														
Convulsions of Children (under 5)	M.	71								1		1		1		3
	F.	58												1		1
Tetanus	M.	8												1		1
	F.	2														
a. Trismus Nascentium	M.	7														
	F.	2														
Chorea	F.	5										1				1
Other Diseases of the Nervous System	M.	7														
	F.	13	1									1				2
a. Organic Brain Disease	M.	1														

b. Cerebral Anæmia	F.	1		1												1
c. Cerebral Tumor	M.	16														
	F.	10														
d. Labio-glosso-laryngeal Paralysis	M.	1												1		1
e. Neuralgia	F.	1														
f. Neurasthenia	M.	1														
	F.	4												1		1
g. Multiple Neuritis	F.	1														
Diseases of the Eye and its Adnexa	M.	1														
Diseases of the Ear—Otitis	M.	12														
	F.	7														
Total Diseases of Nervous System		1807	3	1			2	5		3	3	9	1	16	1	44
CLASS III.—DISEASES OF THE CIRCULATORY SYSTEM.																
Pericarditis	M.	6														
	F.	8														
Endocarditis, Acute	M.	63												2		2
	F.	73												2		2
a. Myocarditis	M.	43														
	F.	40														
Organic Diseases of the Heart	M.	442						2	1			3	2	2		10
	F.	454					1	1	1	2	1	4	1	7		18
a. Cardiac Asthma	M.	1												1		1
	F.	1														
b. Fatty Degeneration	M.	24														
	F.	33	1		1	1										3
c. Valvular	M.	203					1	1				2		1		5
	F.	168	1					1		2		1		2		7
Angina Pectoris	M.	54	1											1		2
	F.	32														

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CAUSES OF DEATH.		STATE.	Tolland.	Andover.	Bolton.	Columbia.	Coventry.	Ellington.	Hebron.	Mansfield.	Somers.	Stafford.	Union.	Vernon.	Willington.	TOTAL.
Affec. of the Arteries (Atheroma, Aneurism, etc.)	M.	8	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
	F.	13	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
a. Aneurism of the Aorta	M.	2	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
	F.	1	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
b. Arterio-Sclerosis	M.	142	-----	-----	-----	----	----	----	1	----	----	----	----	----	----	1
	F.	91	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
c. Atheroma of Coronary Arteries	M.	7	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
	F.	5	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
Embolus and Thrombosis (non-puerperal)	M.	29	1	-----	-----	----	----	----	----	1	----	----	----	----	----	2
	F.	38	1	-----	-----	----	1	----	----	1	----	----	----	----	3	6
Aff. of Veins (Varices, Hemorrhoids, Phlebitis)	F.	5	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
Affec. of the Lymp. Sys. (Lymphangitis, etc.)	M.	1	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
	F.	2	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
Hemorrhages	F.	2	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
a. Purpura Hemorrhagica	M.	4	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
	F.	2	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
Total of Circulatory System		1997	5	-----	1	1	3	5	3	6	1	10	3	18	3	59
CLASS IV.—DISEASES OF THE RESPIRATORY SYSTEM.																
Affections of the Larynx	M.	3	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
	F.	1	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
a. Laryngitis	M.	8	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----
	F.	2	-----	-----	-----	----	----	----	----	----	----	----	----	----	----	----

b. Laryngismus Stridulus	M.	1														
Affections of the Thyroid Body	F.	2														
Bronchitis, Acute	M.	83												2		2
	F.	71														
a. Capillary	M.	26						1			1					2
	F.	22														
Bronchitis, Chronic	M.	66														
	F.	74												1		1
Broncho-Pneumonia	M.	161	1				1		1					1		4
	F.	148					1			1			1		1	4
Pneumonia	M.	524	3					1		2		2		1		9
	F.	495	1			1					3			2		7
a. Pleuro-Pneumonia	M.	17					1									1
	F.	25														
Pleurisy	M.	16														
	F.	17					1									1
Pulmonary Congestion and Apoplexy	M.	18														
	F.	30	1													1
Gangrene of the Lung	M.	1														
Asthma	M.	8														
	F.	10														
Pulmonary Emphysema	M.	4														
	F.	3														
Other Dis. of Respiratory Appar. (Phthisis exc.)	M.	2														
	F.	3														
a. Abscess of the Lung	M.	5														
	F.	4														
b. Pulmonary Hemorrhage	M.	4														
	F.	4														
Total of Respiratory System		1858	6			1	4	2	1	3	4	2	1	7	1	32

TABLE VI—CONTINUED. TOLLAND COUNTY—1908.

CAUSES OF DEATH.		STATE.	Tolland.	Andover.	Bolton.	Columbia.	Coventry.	Ellington.	Hebron.	Mansfield.	Somers.	Stafford.	Union.	Vernon.	Willington.	TOTAL.
CLASS V.—DISEASES OF THE DIGESTIVE APPARATUS.																
Affections of the Mouth and its Adnexa	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Affections of the Pharynx	M.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Quinsy	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Tonsilitis	M.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Affections of the Œsophagus	M.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ulcer of the Stomach	M.	15	....	....	....	....	....	1	....	....	....	....	....	....	....	1
	F.	11	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Other Affect. of the Stomach (Cancer excepted)	M.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Gastritis	M.	37	....	....	....	....	....	....	....	....	....	....	....	1	....	1
	F.	65	....	....	....	....	....	....	....	....	....	....	....	2	....	2
b. Gastric Catarrh	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....

c. Gastric Hemorrhage	M.	2														
	F.	4														
d. Indigestion	M.	49										1				1
	F.	53														
Diarrhœa and Enteritis (under 2 years)	M.	39														
	F.	27		1									1			2
a. Colitis	M.	6														
	F.	5														
b. Cholera Infantum	M.	197					2		1	1						4
	F.	200					1	1			1			1	3	7
c. Entero Colitis	M.	58														
	F.	47														
d. Enteritis	M.	43														
	F.	45										1				1
e. Gastro-Enteritis	M.	133													1	1
	F.	113										3				3
f. Diarrhœa	M.	39														
	F.	37														
Diarrhœa and Enteritis (2 yrs. and over)	M.	17														
	F.	17														
a. Colitis	M.	2														
	F.	8														
b. Diarrhœa	M.	14														
	F.	27							1							1
c. Enteritis	M.	8										1				1
	F.	17										2				2
d. Entero Colitis	M.	6														
	F.	10														
e. Gastro-Enteritis	M.	16														
	F.	19														
Hernias: Intes. Obstructions—																
b. Hernia	M.	21														
	F.	26				1								1		2

TABLE VI—CONTINUED. TOLLAND COUNTY—1908.

CAUSES OF DEATH.		STATE.	Tolland.	Andover.	Bolton.	Columbia.	Coventry.	Ellington.	Hebron.	Mansfield.	Somers.	Stafford.	Union.	Vernon.	Willington.	TOTAL.
c. Volvulus	M.	3						1								1
	F.	2														
d. Intestinal Obstruction	M.	56														
	F.	43										1		1	1	3
Other Affections of Intestines	M.	18														
	F.	7														
a. Intestinal Hemorrhage	M.	1														
	F.	3														
Acute Yellow Atrophy of Liver	F.	3														
Tumors, Hydatid, of the Liver	F.	2														
Cirrhosis of the Liver	M.	85								1						1
	F.	33					1							1		2
a. Hepatitis, interstitial or chronic	M.	2														
	F.	6														
b. Amyloid Degeneration of Liver	F.	1														
c. Slow Atrophy of Liver	M.	1														
	F.	1														
Biliary Calculi	M.	4												1		1
	F.	17												1		1
Other Affections of the Liver	M.	17								1				1		2
	F.	24					1									1
a. Abscess	M.	3														
	F.	3												1		1
b. Tumor	F.	1														

c. Hypertrophy	F.	1														
d. Jaundice (3 mos. and over)	M.	3														
	F.	4												1		1
e. Acute Hepatitis (3 mos. and over)	M.	8														
	F.	1														
Affections of the Spleen	M.	2														
	F.	3										1				1
Peritonitis, Simple (Puerperal excepted)	M.	10												1		1
	F.	22														
Oth. Affec. of Diges. Appar. (Canc. and Tub. ex.)	M.	3														
	F.	2														
Appendicitis and Abscess of the Iliac Fossa—																
a. Appendicitis	M.	49												1		1
	F.	35														
Total of Digestive System		1953		1		1	5	3	2	3	1	10	1	14	5	46
CLASS VI.—DISEASES OF THE GENITO-URINARY APPARATUS AND ITS ADNEXA.																
Nephritis, Acute	M.	71										1		2		3
	F.	72										2		1		3
Bright's Disease	M.	482					1	2		1	2	1		3		10
	F.	370									2	1		2	1	6
a. Albuminuria	M.	2														
	F.	2								1						1
b. Uræmia	M.	21														
	F.	18														
Other Diseases of the Kidneys and their Adnexa	M.	19														
	F.	10														
a. Myoma and Abscess of the Kidney	F.	2														
b. Congestion, renal	M.	1														

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CAUSES OF DEATH.		STATE.	Tolland.	Andover.	Bolton.	Columbia.	Coventry.	Ellington.	Hebron.	Mansfield.	Somers.	Stafford.	Union.	Vernon.	Willington.	TOTAL.
Calculi of the Urinary Tract	M.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Diseases of the Bladder	M.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Cystitis	M.	56	1	....	....	....	1	....	....	....	....	1	....	1	....	4
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Retention of Urine	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Diseases of the Urethra	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Diseases of the Prostate	M.	40	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Non-venereal Diseases of Male Genital Organs	M.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Hemorrhage, Uterine (non-puerperal)	F.	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tumor, Uterine (non-cancerous)	F.	21	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Other Diseases of the Uterus	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Pelvic Abscess	F.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cysts, and Other Tumors of the Ovary	F.	13	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Other Diseases of the Female Genital Organs	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Pyosalpinx	F.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Salpingitis	F.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Non-puerperal Diseases of the Breast (Cancer ex.)	F.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total Genito-Urinary System		1253	1	....	....	....	2	2	....	2	4	6	....	9	1	27

CLASS VII.—THE PUERPERAL STATE.																
Accidents of Pregnancy	F.	21						1								1
a. Abortion	F.	4														
b. Tubal Pregnancy	F.	2														
Hermorrhage, Puerperal	F.	10								1						1
Other Accidents of Labor	F.	5														
a. Dystocia	F.	2										1				1
b. Placenta Previa	F.	7						1								1
Septicæmia, Puerperal	F.	32						1								1
Albuminuria and Puerperal Eclampsia	F.	30														
Other Puerperal Accidents	F.	8														
Total Diseases of the Puerperal State		121						3		1		1				5
CLASS VIII.—DISEASES OF THE SKIN AND CELLULAR TISSUE.																
Gangrene	M.	25					1									1
	F.	15												1		1
Furuncle (Carbuncle)	M.	3														
	F.	2														
Abscess	M.	5														
	F.	3														
Other Diseases of Skin	M.	4														
	F.	10														
Total Dis. of Integumentary and Cellular Tissue		67					1							1		2

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CAUSES OF DEATH.		STATE.	Tolland.	Andover.	Bolton.	Columbia.	Coventry.	Ellington.	Hebron.	Mansfield.	Somers.	Stafford.	Union.	Vernon.	Willington.	TOTAL.
CLASS IX.—DISEASES OF THE ORGANS OF LOCOMOTION.																
Affections of the Bones (non-tuberculous)	F.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
a. Abscess, Mastoid	M.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Rachitis	M.	9	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
c. Osteo-Myelitis	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Arthritis, Oth. Affec. of Jts. (Tub. and Rhm. ex.)	M.	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total Organs of Locomotion		36	....	....	....	....	....	....	....	....	....	....	....	....	....	....
CLASS X.—MALFORMATIONS.																
Malformations, Congenital (Stillbirths excepted)	M.	47	....	....	....	....	....	....	....	1	....	....	....	....	....	1
	F.	56	....	1	....	....	....	....	....	....	....	....	....	1	....	2
a. Hydrocephalus	M.	13	....	....	....	....	....	....	....	....	....	1	....	1	....	2
	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
b. Cyanosis	M.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....
c. Spina Bifida	M.	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	F.	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
d. Open Foramen Ovale	M	14	....	....	....	....	....	....	....	....	....	2	....	....	....	2
	F.	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....
e. Imperforate Anus	M.	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total Malformations		166	....	1	....	....	....	....	....	1	....	3	....	2	....	7

Class XI.—Early Infancy.																
Congenital Debility	M.	102										4		2		6
	F.	70		1												1
a. Atelectasis	M.	17														
	F.	16														
b. Icterus Neonatorum	M.	21										1				1
	F.	7														
c. Premature Birth	M.	270									2	3		2		7
	F.	203														
Other Diseases of Early Infancy	M.	28														
	F.	22												2		2
a. Umbilical Hemorrhage	M.	6														
	F.	5														
Inanition—(under 3 months)	M.	70										1		1		2
	F.	51												1		1
Total Early Infancy		888		1							2	9		8		20
Class XII.—Old Age.																
Senile Debility	M.	124		1		3						1		2		7
	F.	180				1								3		4
Total Old Age		304		1		4						1		5		11
Class XIII.—Affections Produced by External Causes.																
Suicide by Poison	M.	6														
	F.	9														

TABLE VI—CONTINUED. TOLLAND COUNTY—1908.

CAUSES OF DEATH.		STATE.	Tolland.	Andover.	Bolton.	Columbia.	Coventry.	Ellington.	Hebron.	Mansfield.	Somers.	Stafford.	Union.	Vernon.	Willington.	TOTAL.
a. Narcotic Poison	M.	4														
	F.	2														
b. Carbolic Acid	M.	42														
	F.	17														
Suicide by Asphyxia	M.	1														
a. Inhalation of Illuminating Gas	M.	15														
	F.	4														
Suicide by Hanging or Strangulation	M.	11														
	F.	6														
Suicide by Drowning	M.	10														
	F.	8													1	1
Suicide by Firearms	M.	42	1								1					2
	F.	3														
Suicide by Cutting Instruments	M.	13														
Suicide by Jumping from high places	M.	2														
Other Suicides	M.	3														
Total Suicides		198	1								1				1	3
Fractures, not specified—																
a. Arms and Legs	M.	2														
b. Femur	M.	3														
	F.	3														

c. Hip	M.	5										1				1
d. Neck	F.	8														
	M.	2														
e. Ribs	M.	3														
f. Skull	M.	16														
	F.	5														
g. Vertebra	M.	7														
	F.	1														
Dialocations	M.	1														
Other Accidental Traumatisms	M.	49										1		2		3
	F.	6													1	1
a. Cerebral Concussions	M.	4														
	F.	1														
b. Fall	M.	79								1						1
	F.	51														
c. Fall from pole	M.	1														
d. Fall from window	M.	7														
	F.	1														
e. Kick of Horse	M.	6														
f. Live Electric Wire	M.	1														
g. Railway, Steam	M.	148				1										1
	F.	11														
h. Railway, Street	M.	24														
	F.	4														
i. Automobile, Accidents	M.	13														
	F.	4														
j. Injuries by Vehicle	M.	14														
	F.	2														
k. Gun Shot	M.	12														

TABLE VI—CONTINUED. TOLLAND COUNTY—1908.

CAUSES OF DEATH.		STATE.	Tolland.	Andover.	Bolton.	Columbia.	Coventry.	Ellington.	Hebron.	Mansfield.	Somers.	Stafford.	Union.	Vernon.	Willington.	TOTAL.
Burns and Scalds	M.	37						1								1
	F.	47	1													1
Heat and Sunstroke	M.	13						1								1
	F.	8														
Cold and Freezing	M.	5														
	F.	1														
Electric Shock	M.	4														
a. Lightning	M.	4														
	F.	1														
Accidental Drowning	M.	126								1		3				4
	F.	16									1					1
Starvation and Privation	F.	1														
Absorption of Deleterious Gases (Suicide ex.)	M.	19														
	F.	1														
Other Acute Poisonings	M.	28														
	F.	22														
Other External Violence—																
a. Suffocation	M.	15														
	F.	7														
b. Injuries at birth	M.	80												1	1	2
	F.	40												1		1

Capital Punishment—Execution	M.	3														
Homicides	M.	6														
	F.	9												2		2
a. Gunshot	M.	10	1													1
	F.	6														
b. Stab or Cut	M.	6														
Total from Violence		1207	3			1		2		2	2	5		6	3	24
Class XIV.—Ill-defined Diseases.																
Dropsy	M.	6														
	F.	1														
Inanition (over 3 months)	M.	9														
	F.	9														
Marasmus (over 3 months)	M.	57												2		2
	F.	36														
Ill-defined	M.	30														
	F.	19														
Causes unknown	M.	30										1		2		3
	F.	13												1		1
Total Unspecified Causes		210										1		5		6
Grand Total		16000	21	7	5	10	29	28	13	26	23	73	7	118	19	379

RECAPITULATION OF TABLE VI—1908.

CLASSIFIED DISEASES.	STATE.	Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Per cent. to Total Mortality.
Classes.										
I. General Diseases	4133	858	1285	352	897	196	264	185	96	25.83
II. Diseases of Nervous System	1807	359	479	212	386	95	107	125	44	11.29
III. Diseases of Circulatory Apparatus	1997	364	551	198	462	106	103	154	59	12.48
IV. Diseases of the Respiratory System	1858	411	614	148	419	70	100	64	32	11.61
V. Diseases of the Digestive Apparatus	1953	390	617	166	449	95	105	85	46	12.21
VI. Dis. of Genito-Urinary Appar. and its Adnexa	1253	227	364	141	326	55	72	41	27	7.83
VII. The Puerperal State	121	17	38	10	29	10	7	5	5	.75
VIII. Diseases of the Skin and Cellular Tissue	67	15	19	4	14	5	5	3	2	.41
IX. Diseases of the Organs of Locomotion	36	6	17	2	3	4	3	1	......	.22
X. Malformations	166	50	33	6	37	9	16	8	7	1.03
XI. Early Infancy	888	204	308	57	180	33	61	25	20	5.55
XII. Old Age	304	57	93	36	54	15	23	15	11	1.90
XIII. Affections Produced by External Causes	1207	257	374	119	270	49	67	47	24	7.54
XIV. Ill-defined Diseases	210	56	79	15	37	5	8	4	6	1.31
GRAND TOTAL	16000	3271	4871	1466	3563	747	941	762	379	100.00

TABLE VII.

NOSOLOGICAL ARRANGEMENT BY COUNTIES—1908.

CAUSES OF DEATH.		Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total, 1908.	Per cent. to Total Mortality.
Nomenclature of the Statistics of Death.											
CLASS I.—GENERAL DISEASES.											
Typhoid Fever	M.	29	46	9	24	5	9	2	2	126	.78
	F.	15	26	2	11	4	4	3	3	68	.42
Fever, Intermittent	M.	----	1	----	1	----	----	----	----	2	.01
	F.	----	2	----	----	----	----	----	----	2	.01
a. Malaria	M.	2	8	----	2	1	----	----	----	13	.08
	F.	----	4	1	4	----	----	2	1	12	.07
b. Remittent Fever	M.	----	1	----	1	----	----	----	----	2	.01
	F.	----	2	----	1	----	1	1	----	5	.03
Measles	M.	12	23	4	5	1	1	----	----	46	.28
	F.	11	12	4	11	----	2	----	2	42	.26
Scarlatina	M.	14	5	7	5	----	1	----	----	32	.20
	F.	6	5	3	10	----	3	----	1	28	.17
Whooping Cough	M.	9	14	----	12	1	1	1	1	39	.24
	F.	21	13	----	15	2	5	----	----	56	.35
Diphtheria—Membranous Croup	M.	13	48	3	21	3	2	8	2	100	.62
	F.	24	22	4	24	5	6	5	4	94	.58
Grippe—Influenza	M.	27	59	17	32	13	12	6	11	177	1.10
	F.	49	60	23	35	28	11	2	11	219	1.37
Cholera, Nostras	M.	2	----	----	----	----	----	----	1	3	.01
	F.	1	2	----	1	----	1	1	1	7	.04
Dysentery	M.	11	3	4	9	3	1	2	----	33	.20
	F.	10	12	5	8	4	4	5	2	50	.31

TABLE VII—Continued—1908.

CAUSES OF DEATH.		Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total, 1908.	Per cent. to Total Mortality
Erysipelas	M.	5	9	....	4	....	1	2	....	21	.13
	F.	3	10	1	4	....	3	....	....	21	.13
Other Epidemic Affections	F.	2	3	....	....	....	....	....	....	5	.03
Purulent Infection and Septicæmia	M.	7	5	2	5	....	1	1	....	21	.13
	F.	2	4	1	....	....	....	....	1	8	.05
a. Pyæmia	M.	3	2	....	4	....	1	....	....	10	.06
	F.	1	....	1	....	2	....	....	....	4	.02
Rabies	M.	....	....	....	....	....	1	....	....	1	.00
Tubercle of Larynx	M.	1	2	1	3	....	....	....	1	8	.05
	F.	1	....	....	1	....	....	....	....	2	.01
Tubercle of Lungs	M.	166	259	62	190	29	47	35	14	802	5.01
	F.	104	184	53	126	38	43	33	8	589	3.68
Tubercle of Meninges	M.	9	14	3	15	3	5	2	1	52	.32
	F.	4	15	3	12	1	2	....	....	37	.23
Tubercle, Abdominal	M.	7	8	4	4	1	2	4	....	30	.18
	F.	6	7	2	....	1	4	1	....	21	.13
Pott's Disease, Psoas Abscess	M.	1	2	....	2	....	....	....	....	5	.03
	F.	....	....	....	1	....	1	....	....	2	.01
Abscess, Cold and by Congestion	M.	1	1	....	1	....	....	....	....	3	.01
White Tumors (White Swellings)	M.	2	1	1	....	....	....	1	....	5	.03
	F.	....	....	....	1	....	....	....	....	1	.00
Tubercle of Other Organs	M.	1	3	1	....	1	3	1	....	10	.06
	F.	1	....	....	1	....	....	....	....	2	.01
Generalized Tubercle	M.	4	11	2	5	1	....	1	....	24	.15
	F.	3	5	1	5	....	1	1	....	16	.10
Scrofula	F.	....	....	1	....	1	....	....	....	2	.01

Syphilis	M.	3	3	3	3	----	2	1	----	15	.09
	F.	5	3	1	3	----	----	----	----	12	.07
Gonorrhœal Infections of Children	M.	----	----	----	1	----	----	----	----	1	.00
Cancer and Other Malignant Tumors of Buccal Cavity	M.	1	----	----	----	----	----	----	----	1	.00
of Lips	M.	5	----	----	----	1	1	----	---	7	.04
of Maxilla	M.	2	1	2	1	----	1	----	----	7	.04
	F.	----	1	----	4	----	----	----	----	5	.03
Cancer of Tongue	M.	2	3	1	1	1	----	----	----	8	.05
Cancer and Other Malignant Tumors of Stomach and Liver—	M.	1	----	----	1	----	----	----	----	2	.01
	F.	----	----	1	----	----	----	----	----	1	.00
of Gall Bladder	M.	1	1	----	1	----	----	----	----	3	.01
	F.	----	3	1	----	----	----	----	----	4	.02
of Liver	M.	8	8	4	7	----	3	----	2	32	.20
	F.	9	13	3	5	2	2	3	1	38	.23
Œsophagus	M.	1	1	----	----	----	----	----	----	2	.01
of Pancreas	M.	2	1	----	----	----	----	----	----	3	.01
	F.	----	2	1	----	1	----	1	----	5	.03
of Pylorus	M.	----	----	----	1	----	----	1	----	2	.01
	F.	----	----	----	----	----	----	----	1	1	.00
of Stomach	M.	21	39	4	17	3	5	5	2	96	.60
	F.	17	18	6	19	7	4	5	3	79	.49
Cancer and Other Malig. Tum. of Perit'm, Intes. and Rectum—	M.	1	----	----	----	----	----	----	----	1	.00
	F.	2	----	----	2	----	----	----	----	4	.02
of Colon	M.	----	1	----	----	----	----	----	----	1	.00
	F.	----	2	1	1	1	----	1	1	7	.04
of Intestines	M.	7	6	----	3	1	1	2	----	20	.12
	F.	7	9	3	7	4	1	3	----	34	.21
of Rectum	M.	----	6	----	3	----	----	1	----	10	.06
	F.	4	8	4	4	1	----	----	1	22	.13
of Sigmoid Flexure	M.	----	----	----	1	----	----	----	----	1	.00
	F.	1	2	----	----	----	----	----	----	3	.01
of Spleen	F.	----	1	----	----	----	----	----	----	1	.00
of Peritoneum	F.	----	----	1	2	----	----	1	----	4	.02

TABLE VII—CONTINUED—1908.

CAUSES OF DEATH.		Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total, 1908.	Per cent. to Total Mortality.
Cancer and Other Malignant Tumors of the Female Genitals—											
of Cervix	F.	2	1	----	3	----	----	----	----	6	.03
of Ovary	F.	2	1	1	3	---	1	----	----	8	.05
of Uterus	F.	17	36	11	30	7	8	6	3	118	.73
of Vagina	F.	----	1	----	----	----	----	----	----	1	.00
of Vulva	F.	----	----	1	----	----	----	----	----	1	.00
Cancer and Other Malig. Tumors of the Breast	F.	17	20	13	24	1	4	6	3	88	.55
Cancer and Other Malignant Tumors of the Skin	M.	----	5	1	1	----	1	----	----	8	.05
	F.	1	2	----	----	----	----	1	----	4	.02
of Face	M.	2	2	2	3	3	1	1	----	14	.08
	F.	----	1	----	2	---	1	----	----	4	.02
Cancer and Other Malignant Tumors of other Organs and Organs not specified—	M.	12	21	5	11	----	7	1	----	57	.35
	F.	11	13	4	19	----	3	1	----	51	.31
of Abdomen	M.	----	----	---	1	----	----	----	----	1	.00
	F.	1	----	1	----	----	----	----	1	3	.01
of Bladder	M.	----	2	1	1	----	1	2	1	8	.05
	F.	1	1	----	----	----	----	1	----	3	.01
of Lungs	M.	----	----	1	1	----	----	----	----	2	.01
	F.	----	----	----	----	1	----	----	----	1	.00
of Pelvis	M.	----	1	----	1	----	1	----	----	3	.01
	F.	1	----	----	2	----	----	----	----	3	.01
of Penis	M.	----	----	----	----	----	----	----	1	1	.00
of Testicle	M.	----	2	----	----	----	----	----	----	2	.01
Other Tumors (Tumors of the Female Genitals excepted)	M.	2	1	----	----	----	----	----	----	3	.01
	F.	1	----	----	1	----	----	----	----	2	.01
a. Abdominal	M.	----	2	----	----	----	----	----	----	2	.01
	F.	----	1	3	1	1	1	1	----	8	.05

b. Intestinal	M.	----	----	----	1	----	----	----	----	1	.00
Rheumatism, Acute, Articular	M.	7	14	3	7	----	2	2	1	36	.22
	F.	16	12	4	11	1	3	1	1	49	.30
Rheumatism, Chronic, and Gout	M.	2	4	4	2	----	1	----	----	13	.08
	F.	2	5	3	2	----	4	2	----	18	.11
Scorbutus	M.	1	----	----	----	----	----	----	----	1	.00
Diabetes	M.	18	11	6	19	4	5	7	2	72	.45
	F.	21	38	9	17	3	10	5	1	104	.65
Goiter, Exophthalmic	F.	----	2	2	----	----	1	1	1	7	.04
Addison's Disease	M.	----	2	----	1	----	----	1	----	4	.02
	F.	1	----	----	----	----	----	----	----	1	.00
Leukæmia	M.	----	----	1	----	----	----	----	1	2	.01
	F.	----	----	1	----	----	----	----	----	1	.00
a. Hodgkin's Disease	M.	3	1	----	----	----	----	----	----	4	.02
Anæmia, Chlorosis	M.	2	1	----	1	----	----	----	----	4	.02
	F.	1	3	1	----	----	----	----	----	5	.03
a. Anæmia, Pernicious	M.	1	3	2	3	1	----	----	----	10	.06
	F.	3	5	3	10	1	----	----	2	24	.15
Other General Diseases	M.	1	----	----	1	----	----	----	----	2	.01
	F.	----	----	----	1	----	1	----	----	2	.01
Alcoholism, Acute and Chronic	M.	11	14	6	7	3	6	2	----	49	.30
	F.	5	5	----	1	----	----	----	----	11	.06
a. Delirium Tremens	M.	---	5	----	3	----	2	----	----	10	.06
Saturnism	M.	----	1	----	----	----	----	----	----	1	.00
	F.	1	----	----	1	----	----	----	----	2	.01
Other Chronic Poisonings	M.	1	1	1	----	----	1	----	----	4	.02
	F.	1	----	1	2	----	----	----	----	4	.02
Total General Diseases		858	1285	352	897	196	264	185	96	4133	25.83
CLASS II.—DISEASES OF THE NERVOUS SYSTEM AND ORGANS OF SPECIAL SENSE.											
Encephalitis	F.	----	----	1	----	----	----	----	----	1	.00
Meningitis, Simple	M.	14	39	10	22	5	1	3	----	94	.58
	F.	8	30	13	17	3	7	1	1	80	.50

TABLE VII—CONTINUED—1908.

CAUSES OF DEATH.		Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total, 1908.	Per cent. to Total Mortality.
a. Epidemic Cerebro-spinal Meningitis	M.	1	----	----	----	----	----	----	----	1	.00
b. Cerebro-spinal Meningitis	M.	6	8	2	4	----	1	1	1	23	.14
	F.	5	11	2	9	1	3	2	----	33	.20
c. Lepto-Meningitis	M.	1	----	----	----	----	----	----	----	1	.00
	F.	1	1	----	----	----	----	----	----	2	.01
d. Spinal Meningitis	M.	4	4	1	3	----	----	2	----	14	.08
	F.	2	6	----	5	----	----	1	----	14	.08
Locomotor Ataxia, Progressive	M.	4	3	5	6	2	1	----	2	23	.14
	F.	1	----	2	----	----	----	----	1	4	.02
Other Diseases of the Spinal Cord	M.	5	5	----	2	----	----	----	1	13	.08
	F.	5	5	4	2	----	----	----		16	.10
a. Lateral Sclerosis	M.	2	1	2	2	----	----	----	----	7	.04
	F.	2	1	----	1	----	----	1	----	5	.03
b. Muscular Atrophy	F.	----	----	----	1	----	----	----	----	1	.00
c. Paralysis Agitans	M.	1	4	----	1	2	1	1	----	10	.06
	F.	1	2	----	1	1	----	----	----	5	.03
Cerebral Congestion—Hemorrhage	M.	89	99	50	94	22	39	29	9	431	2.69
	F.	110	132	61	91	25	23	34	16	492	3.07
Cerebral Softening	M.	2	2	3	3	2	3	----	----	15	.09
	F.	4	4	2	4	2	1	----	----	17	.10
Paralysis without Specified Cause	M.	9	5	6	8	8	4	2	1	43	.26
	F.	8	13	5	9	2	----	1	----	38	.23
a. Hemiplegia	M.	3	6	2	7	----	----	----	----	18	.11
	F.	2	7	2	1	1	----	----	----	13	.08

b. Paraplegia	F.	1	----	----	2	----	----	----	----	3	.01
Paralysis, General	M.	2	3	5	13	1	----	16	----	40	.25
	F.	1	1	2	10	1	1	2	----	18	.11
Other Forms of Mental Alienation	M.	2	1	----	3	----	----	4	----	10	.06
	F.	5	5	2	6	1	2	4	1	26	.16
Epilepsy	M.	7	4	4	2	2	3	3	----	25	.15
	F.	5	3	2	6	1	6	11	----	34	.21
Eclampsia (non-puerperal) (5 years and over)	M.	----	----	1	----	----	----	----	----	1	.00
	F.	2	3	1	1	----	----	----	----	7	.04
Convulsions of Children (under 5)	M.	9	23	8	17	5	4	2	3	71	.44
	F.	14	16	2	17	3	4	1	1	58	.36
Tetanus	M.	2	3	----	1	----	----	1	1	8	.05
	F.	1	----	1	----	----	----	----	----	2	.01
a. Trismus Nascentium	M.	1	1	----	2	----	1	2	----	7	.04
	F.	1	1	----	----	----	----	----	----	2	.01
Chorea	F.	1	2	----	1	----	----	----	1	5	.03
Other Diseases of the Nervous System	M.	1	2	2	2	----	----	----	----	7	.04
	F.	2	6	1	1	----	1	----	2	13	.08
a. Organic Brain Disease	M.	----	----	----	----	----	----	1	----	1	.00
b. Cerebral Anæmia	F.	----	----	----	----	----	----	----	1	1	.00
c. Cerebral Tumor	M.	2	6	2	5	1	----	----	----	16	.10
	F.	2	4	3	----	1	----	----	----	10	.06
d. Labio-glosso-laryngeal Paralysis	M.	----	----	----	----	----	----	----	1	1	.00
e. Neuralgia	F.	----	----	1	----	----	----	----	----	1	.00
f. Neurasthenia	M.	1	----	----	----	----	----	----	----	1	.00
	F.	----	----	----	2	1	----	----	1	4	.02
g. Multiple Neuritis	F.	----	1	----	----	----	----	----	----	1	.00
Diseases of the Eye and its Adnexa	M.	1	----	----	----	----	----	----	----	1	.00
Diseases of the Ear—Otitis	M.	4	3	2	1	1	1	----	----	12	.07
	F.	2	3	----	1	1	----	----	----	7	.04
Total Diseases of Nervous System		359	479	212	386	95	107	125	44	1807	11.29

TABLE VII—CONTINUED—1908.

CAUSES OF DEATH.		Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total, 1908.	Per cent. to Total Mortality.
CLASS III.—DISEASES OF THE CIRCULATORY SYSTEM.											
Pericarditis	M.	---	1	----	4	----	----	1	----	6	.03
	F.	1	3	----	2	----	----	2	----	8	.05
Endocarditis, Acute	M.	10	6	3	34	1	2	5	2	63	.39
	F.	10	20	1	32	1	1	6	2	73	.45
a. Myocarditis	M.	8	12	5	13	1	3	1	----	43	.26
	F.	11	11	2	13	----	3	----	----	40	.25
Organic Diseases of the Heart	M.	98	115	49	113	21	17	19	10	442	2.76
	F.	71	153	49	92	25	24	22	18	454	2.83
a. Cardiac Asthma	M.	----	----	----	----	----	----	----	1	1	.00
	F.	----	----	1	----	----	----	----	----	1	.00
b. Fatty Degeneration	M.	11	7	1	2	----	1	2	----	24	.15
	F.	14	5	2	3	----	3	3	3	33	.20
c. Valvular	M.	28	55	23	33	16	6	37	5	203	1.26
	F.	25	43	20	28	15	5	25	7	168	1.05
Angina Pectoris	M.	7	15	8	12	3	2	5	2	54	.33
	F.	3	8	7	9	1	2	2	----	32	.20
Affections of Arteries (Atheroma, Aneurism, etc.)	M.	1	3	1	1	----	1	1	----	8	.05
	F.	4	----	1	4	----	3	1	----	13	.08
a. Aneurism of the Aorta	M.	----	1	----	----	----	----	1	----	2	.01
	F.	----	----	----	----	1	----	----	----	1	.00
b. Arterio-Sclerosis	M.	31	42	12	28	8	15	5	1	142	.88
	F.	22	25	7	22	1	4	10	----	91	.56
c. Atheroma of Coronary Arteries	M.	----	2	----	1	----	4	----	----	7	.04
	F.	----	----	----	1	2	2	----	----	5	.03
Embolus and Thrombosis (non-puerperal)	M.	5	6	2	8	3	1	2	2	29	.18
	F.	1	14	4	4	4	1	4	6	38	.23

Affections of Veins (Varices, Hemorrhoids, Phlebitis)	F.	....	1	....	2	2	....	....	....	5	.03
Affections of the Lymphatic System (Lymphangitis, etc.)	M.	....	....	....	....	....	1	....	....	1	.00
	F.	....	1	....	....	....	1	....	....	2	.01
Hemorrhages	F.	2	....	....	....	....	....	....	....	2	.01
a. Purpura Hemorrhagica	M.	....	1	....	1	1	1	....	....	4	.02
	F.	1	1	....	....	....	....	....	....	2	.01
Total of Circulatory System		364	551	198	462	106	103	154	59	1997	12.48
CLASS IV.—DISEASES OF THE RESPIRATORY SYSTEM.											
Affections of the Larynx	M.	....	....	....	1	....	1	1	....	3	.01
	F.	1	....	....	....	....	....	....	....	1	.00
a. Laryngitis	M.	3	1	1	3	....	....	....	....	8	.05
	F.	1	....	....	....	1	....	....	....	2	.01
b. Laryngismus Stridulus	M.	....	....	....	1	....	....	....	....	1	.00
Affections of the Thyroid Body	F.	1	....	1	....	....	....	....	....	2	.01
Bronchitis, Acute	M.	18	30	3	14	11	3	2	2	83	.51
	F.	15	28	4	13	7	3	1	....	71	.44
a. Capillary	M.	7	6	3	5	1	1	1	2	26	.16
	F.	1	5	2	11	2	1	....	....	22	.13
Bronchitis, Chronic	M.	10	19	8	17	3	8	1	....	66	.41
	F.	18	21	10	13	5	1	5	1	74	.46
Broncho-Pneumonia	M.	32	65	14	25	2	8	11	4	161	1.00
	F.	27	64	10	21	2	9	11	4	148	.92
Pneumonia	M.	129	175	36	120	15	29	11	9	524	3.27
	F.	112	149	40	134	16	26	11	7	495	3.09
a. Pleuro-Pneumonia	M.	3	5	3	4	1	....	....	1	17	.10
	F.	4	6	4	8	1	2	....	....	25	.15
Pleurisy	M.	2	3	5	3	1	1	1	....	16	.10
	F.	4	5	1	5	....	1	....	1	17	.10
Pulmonary Congestion and Apoplexy	M.	5	2	2	5	....	1	3	....	18	.11
	F.	3	14	1	6	....	2	3	1	30	.18

TABLE VII—Continued—1908.

CAUSES OF DEATH.		Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total, 1908.	Per cent. to Total Mortality.
Gangrene of the Lung	M.	1	....	....	....	....	....	....	....	1	.00
Asthma	M.	3	2	....	1	....	1	1	....	8	.05
	F.	1	5	....	2	1	1	....	....	10	.06
Pulmonary Emphysema	M.	1	....	....	1	1	....	1	....	4	.02
	F.	2	....	....	....	....	1	....	....	3	.01
Other Diseases of Respiratory Apparatus (Phthisis excepted)	M.	....	2	....	....	....	....	....	....	2	.01
	F.	1	2	....	....	....	....	....	....	3	.01
a. Abscess of the Lung	M.	4	....	....	1	....	....	....	....	5	.03
	F.	....	4	....	....	....	....	....	....	4	.02
b. Pulmonary Hemorrhage	M.	1	1	....	2	....	....	....	....	4	.02
	F.	1	....	....	3	....	....	....	....	4	.02
Total of Respiratory System		411	614	148	419	70	100	64	32	1858	11.61
Class V.—Diseases of the Digestive Apparatus.											
Affections of the Mouth and its Adnexa	M.	....	1	....	1	....	....	....	....	2	.01
	F.	....	1	3	1	....	1	....	....	6	.03
Affections of the Pharynx	M.	2	1	....	1	....	....	....	....	4	.02
	F.	2	1	....	....	....	....	....	....	3	.01
a. Quinsy	M.	....	1	....	....	....	....	....	....	1	.00
	F.	....	....	....	1	....	....	....	....	1	.00
b. Tonsilitis	M.	....	3	....	....	....	....	1	....	4	.02
	F.	....	....	2	1	....	....	....	....	3	.01
Affections of the Œsophagus	M.	1	1	1	1	....	....	....	....	4	.02
	F.	....	1	....	....	....	....	1	....	2	.01

Ulcer of the Stomach	M.	2	8	----	8	1	----	----	1	15	.09
	F.	4	1	1	3	1	1	----	----	11	.06
Other Affections of the Stomach (Cancer excepted)	M.	----	2	1	3	----	1	----	----	7	.04
	F.	1	2	----	----	1	2	----	----	6	.03
a. Gastritis	M.	6	10	3	10	3	2	2	1	37	.23
	F.	10	20	6	13	9	3	2	2	65	.40
b. Gastric Catarrh	M.	----	----	2	----	----	----	----	----	2	.01
	F.	----	----	----	----	----	1	----	----	1	.00
c. Gastric Hemorrhage	M.	----	2	----	----	----	----	----	----	2	.01
	F.	----	2	1	----	----	1	----	----	4	.02
d. Indigestion	M.	6	16	6	10	1	6	3	1	49	.30
	F.	10	12	8	11	6	5	1	----	53	.33
Diarrhœa and Enteritis (under 2 years)	M.	7	15	2	12	----	3	----	----	39	.24
	F.	2	9	1	10	----	2	1	2	27	.17
a. Colitis	M.	----	3	1	2	----	----	----	----	6	.03
	F.	----	1	2	2	----	----	----	----	5	.03
b. Cholera Infantum	M.	42	61	11	43	18	8	10	4	197	1.23
	F.	46	51	19	51	12	3	11	7	200	1.25
c. Entero-Colitis	M.	7	28	9	8	2	3	1	----	58	.36
	F.	9	21	4	11	1	----	1	----	47	.29
d. Enteritis	M.	11	14	2	8	1	4	3	----	43	.26
	F.	15	11	5	5	----	1	7	1	45	.28
e. Gastro-Enteritis	M.	21	53	5	38	4	2	9	1	133	.83
	F.	19	34	8	34	5	6	4	3	113	.70
f. Diarrhœa	M.	4	21	4	4	1	4	1	----	39	.24
	F.	10	14	3	6	3	1	----	----	37	.23
Diarrhœa and Enteritis (2 yrs. and over)	M.	3	5	1	4	----	3	1	----	17	.10
	F.	5	4	3	4	----	----	1	----	17	.10
a. Colitis	M.	----	----	----	2	----	----	----	----	2	.01
	F.	1	2	----	2	1	2	----	----	8	.05
b. Diarrhœa	M.	2	5	----	5	1	1	----	----	14	.08
	F.	5	8	4	4	----	3	2	1	27	.17
c. Enteritis	M.	----	4	----	2	----	1	----	1	8	.05
	F.	3	3	2	3	----	2	2	2	17	.10
d. Entero Colitis	M.	1	1	1	2	----	----	1	---	6	.03
	F.	1	3	2	1	----	1	2	----	10	.06

TABLE VII—Continued—1908.

CAUSES OF DEATH.		Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total, 1908.	Per cent. to Total Mortality.
e. Gastro-Enteritis	M.	....	8	2	6	....	....	....	....	16	.10
	F.	2	11	1	2	....	2	1	....	19	.11
Hernias: Intestinal Obstructions—											
a. Hernia	M.	8	7	1	2	1	2	....	....	21	.13
	F.	7	6	2	7	....	1	1	2	26	.16
b. Volvulus	M.	1	1	....	....	....	....	....	1	3	.01
	F.	....	1	....	1	....	....	....	....	2	.01
c. Intestinal Obstruction	M.	10	15	2	20	2	6	1	....	56	.35
	F.	11	12	6	7	1	2	1	3	43	.26
Other Affections of Intestines	M.	5	4	2	5	1	1	....	....	18	.11
	F.	1	4	....	1	....	....	1	....	7	.04
a. Intestinal Hemorrhage	M.	....	1	....	....	....	....	....	....	1	.00
	F.	....	....	1	2	....	....	....	....	3	.01
Acute Yellow Atrophy of Liver	F.	....	2	....	....	....	1	....	....	3	.01
Tumors, Hydatid, of the Liver	F.	1	1	....	....	....	....	....	....	2	.01
Cirrhosis of the Liver	M.	22	18	7	25	3	7	2	1	85	.53
	F.	6	10	....	9	2	1	3	2	33	.20
a. Hepatitis, interstitial or chronic	M.	....	....	1	1	....	....	....	....	2	.01
	F.	2	2	1	1	....	....	....	....	6	.03
b. Amyloid Degeneration of Liver	F.	....	1	....	....	....	....	....	....	1	.00
c. Slow Atrophy of Liver	M.	....	....	....	....	....	1	....	....	1	.00
	F.	1	....	....	....	....	....	....	....	1	.00
Biliary Calculi	M.	1	2	....	....	....	....	....	1	4	.02
	F.	3	6	1	3	1	....	2	1	17	.10

Other Affections of the Liver	M.	5	4	1	4	----	1	----	2	17	.10
	F.	6	6	----	5	2	3	1	1	24	.15
a. Abscess	M.	3	----	----	----	----	----	----	----	3	.01
	F.	1	1	----	----	----	----	----	1	3	.01
b. Tumor	F.	----	----	----	1	----	----	----	----	1	.00
c. Hypertrophy	F.	----	----	----	----	----	----	1	----	1	.00
d. Jaundice (3 mos. and over)	M.	----	----	1	1	1	----	----	----	3	.01
	F.	----	1	----	2	----	----	----	1	4	.02
e. Acute Hepatitis (3 mos. and over)	M.	2	----	1	----	---	----	----	----	3	.01
	F.	----	----	1	----	----	----	----	----	1	.00
Affections of the Spleen	M.	2	----	----	----	----	----	----	----	2	.01
	F.	1	----	----	1	----	----	----	1	3	.01
Peritonitis, Simple (Puerperal excepted)	M.	2	2	----	2	2	----	1	1	10	.06
	F.	6	5	4	4	----	1	2	----	22	.13
Other Affec. of Digestive Appar. (Cancer and Tubercle ex.)	M.	2	1	----	----	----	----	----	----	3	.01
	F.	1	----	1	----	----	----	----	----	2	.01
Appendicitis and Abscess of the Iliac Fossa—											
a. Appendicitis	M.	14	16	3	8	6	1	----	1	49	.30
	F.	6	13	4	7	2	2	1	----	35	.21
Total of Digestive System		390	617	166	449	95	105	85	46	1953	12.21
CLASS VI.—DISEASES OF THE GENITO-URINARY APPARATUS AND ITS ADNEXA.											
Nephritis, Acute	M.	8	27	7	19	3	3	1	3	71	.44
	F.	11	23	8	20	----	4	3	3	72	.45
Bright's Disease	M.	90	146	54	121	17	30	14	10	482	3.01
	F.	74	80	44	109	18	25	14	6	370	2.31
a. Albuminuria	M.	1	----	----	----	1	----	----	----	2	.01
	F.	----	1	----	----	----	----	----	1	2	.01
b. Uræmia	M.	4	7	2	5	1	1	1	----	21	.13
	F.	6	5	----	5	----	1	1	----	18	.11

TABLE VII—Continued—1908.

CAUSES OF DEATH.		Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total, 1908.	Per cent. to Total Mortality.
Other Diseases of the Kidneys and their Adnexa	M.	5	1	6	6	1	....	....	....	19	.11
	F.	....	4	2	4	....	....	....	....	10	.06
a. Myoma and Abscess of Kidney	F.	....	....	....	2	....	....	....	....	2	.01
b. Congestion, renal	M.	....	....	1	....	....	....	....	....	1	.00
Calculi of the Urinary Tract	M.	2	1	....	1	1	....	1	....	6	.03
	F.	....	1	....	....	....	....	....	....	1	.00
Diseases of the Bladder	M.	....	2	....	1	....	....	2	....	5	.03
	F.	....	1	....	....	....	....	2	....	3	.01
a. Cystitis	M.	7	21	9	10	3	1	1	4	56	.35
	F.	....	1	....	1	....	....	....	....	2	.01
b. Retention of Urine	M.	....	3	....	....	....	....	....	....	3	.01
Diseases of the Urethra	M.	1	....	....	2	....	....	....	....	3	.01
	F.	....	....	....	2	....	....	....	....	2	.01
Diseases of the Prostate	M.	3	17	2	7	4	6	1	....	40	.25
Non-venereal Diseases of Male Genital Organs	M.	....	....	....	....	1	....	....	....	1	.00
Hemorrhage, Uterine (non-puerperal)	F.	....	....	1	....	....	....	....	....	1	.00
Tumor, Uterine (non-cancerous)	F.	6	10	3	2	....	....	....	....	21	.13
Other Diseases of the Uterus	F.	....	2	....	1	....	1	....	....	4	.02
a. Pelvic Abscess	F.	1	3	....	1	1	....	....	....	6	.03
Cysts, and other Tumors of the Ovary	F.	4	4	1	....	4	....	....	....	13	.08
Other Diseases of the Female Genital Organs	F.	1	1	1	1	....	....	....	....	4	.02
a. Pyosalpinx	F.	2	2	....	3	....	....	....	....	7	.04
b. Salpingitis	F.	1	....	....	2	....	....	....	....	3	.01
Non-puerperal Diseases of the Breast (Cancer excepted)	F.	....	1	....	1	....	....	....	....	2	.01
Total Genito-Urinary System		227	364	141	326	55	72	41	27	1253	7.83

CLASS VII.—THE PUERPERAL STATE.											
Accidents of Pregnancy	F.	5	5	....	6	1	2	1	1	21	.13
a. Abortion	F.	....	3	....	1	....	....	....	....	4	.02
b. Tubal Pregnancy	F.	...	1	....	....	....	1	....	....	2	.01
Hemorrhage, Puerperal	F.	1	3	1	3	....	1	....	1	10	.06
Other Accidents of Labor	F.	1	1	1	2	....	....	....	....	5	.03
a. Dystocia	F.	....	....	....	1	....	....	....	1	2	.01
b. Placenta Previa	F.	1	1	....	2	1	1	....	1	7	.04
Septicæmia, Puerperal	F.	4	8	4	6	4	2	3	1	32	.20
Albuminuria and Puerperal Eclampsia	F.	5	14	1	7	2	....	1	....	30	.18
Other Puerperal Accidents	F.	....	2	3	1	2	....	....	....	8	.05
Total Diseases of the Puerperal State		17	38	10	29	10	7	5	5	121	.75
CLASS VIII.—DISEASES OF THE SKIN AND CELLULAR TISSUE.											
Gangrene	M.	5	5	2	4	4	4	....	1	25	.15
	F.	2	6	....	3	1	....	2	1	15	.09
Furuncle (Carbuncle)	M.	....	1	....	1	....	1	....	....	3	.01
	F.	1	....	1	....	....	....	....	....	2	.01
Abscess	M.	3	....	1	1	....	....	....	....	5	.03
	F.	....	1	....	2	....	....	....	....	3	.01
Other Diseases of Skin	M.	1	3	....	....	....	....	....	....	4	.02
	F.	3	3	....	3	....	....	1	....	10	.06
Total Diseases of Integumentary and Cellular Tissue		15	19	4	14	5	5	3	2	67	.42

TABLE VII—CONTINUED—1908.

CAUSES OF DEATH.		Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total, 1908.	Per cent. to Total Mortality.
CLASS IX.—DISEASES OF THE ORGANS OF LOCOMOTION.											
Affections of the Bones (non-tuberculous)	F.	----	2	----	1	----	1	----	----	4	.02
a. Abscess, Mastoid	M.	1	4	1	----	----	1	----	----	7	.04
	F.	1	4	----	----	----	----	----	----	5	.03
b. Rachitis	M.	3	3	----	----	1	1	1	----	9	.05
	F.	----	2	----	1	2	----	----	----	5	.03
c. Osteo-Myelitis	M.	----	2	----	1	----	----	----	----	3	.01
Arthritis, Other Affections of Joints (Tub. and Rhm. ex.)	F.	1	----	1	----	1	----	----	----	3	.01
Total Organs of Locomotion		6	17	2	3	4	3	1	----	36	.22
CLASS X.—MALFORMATIONS.											
Malformations, Congenital (Stillbirths excepted)	M.	13	9	1	11	4	6	2	1	47	.29
	F.	19	9	4	12	3	4	3	2	56	.35
a. Hydrocephalus	M.	4	1	----	3	----	3	----	2	13	.08
	F.	1	1	----	3	----	----	----	----	5	.03
b. Cyanosis	M.	2	1	1	1	1	1	----	----	7	.04
	F.	3	2	----	----	----	1	----	----	6	.03
c. Spina Bifida	M.	2	1	----	1	----	----	----	----	4	.02
	F.	2	----	----	2	----	1	----	----	5	.03
d. Open Foramen Ovale	M.	3	7	----	----	----	----	2	2	14	.08
	F.	1	2	----	3	1	----	----	----	7	.04
e. Imperforate Anus	M.	----	----	----	1	----	----	1	----	2	.01
Total Malformations		50	38	6	37	9	16	8	7	166	1.04

CLASS XI.—EARLY INFANCY.											
Congenital Debility	M.	25	41	2	19	1	6	2	6	102	.63
	F.	16	28	6	13	3	2	1	1	70	.43
a. Atelectasis	M.	3	6	2	3	1	2	----	----	17	.10
	F.	6	6	----	2	----	2	----	----	16	.10
b. Icterus Neonatorum	M.	7	4	1	7	----	1	----	1	21	.13
	F.	2	----	1	1	----	3	----	----	7	.04
c. Premature Birth	M.	61	98	18	41	11	23	11	7	270	1.68
	F.	53	68	18	38	9	12	5	----	203	1.26
Other Diseases of Early Infancy	M.	4	10	2	5	4	----	3	----	28	.17
	F.	6	7	1	----	2	3	1	2	22	.13
a. Umbilical Hemorrhage	M.	1	2	----	3	----	----	----	----	6	.03
	F.	2	2	----	1	----	----	----	----	5	.03
Inanition under 3 months	M.	13	25	3	22	----	3	2	2	70	.43
	F.	5	11	3	25	2	4	----	1	51	.31
Total Early Infancy		204	308	57	180	33	61	25	20	888	5.55
CLASS XII.—OLD AGE.											
Senile Debility	M.	18	37	13	26	6	10	7	7	124	.77
	F.	39	56	23	28	9	13	8	4	180	1.12
Total Old Age		57	93	36	54	15	23	15	11	304	1.91
CLASS XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.											
Suicide by Poison	M.	1	1	3	1	----	----	----	----	6	.03
	F.	1	1	2	2	1	2	----	----	9	.05

TABLE VII—CONTINUED—1908.

CAUSES OF DEATH.		Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total, 1908.	Per cent. to Total Mortality.
a. Narcotic Poison	M.	1	....	....	1	1	1	....	....	4	.02
	F.	....	....	....	1	....	....	1	....	2	.01
b. Carbolic Acid	M.	8	22	5	4	1	....	2	....	42	.26
	F.	5	7	....	3	....	2	....	....	17	.10
Suicide by Asphyxia	M.	1	....	....	....	....	....	....	....	1	.00
a. Inhalation of Illuminating Gas	M.	5	5	....	4	....	1	....	....	15	.09
	F.	1	....	....	1	....	1	1	....	4	.02
Suicide by Hanging or Strangulation	M.	3	3	....	3	....	2	....	....	11	.06
	F.	1	2	1	1	....	1	....	....	6	.03
Suicide by Drowning	M.	2	5	....	1	1	....	1	....	10	.06
	F.	1	1	1	2	....	....	2	1	8	.05
Suicide by Firearms	M.	12	14	5	5	....	4	....	2	42	.26
	F.	2	....	....	....	1	....	....	....	3	.01
Suicide by Cutting Instruments	M.	2	4	1	5	1	....	....	....	13	.08
Suicide by Jumping from high places	M.	....	2	....	....	....	....	....	....	2	.01
Other Suicides	M.	1	....	1	....	....	1	....	....	3	.01
Total Suicides		47	67	19	34	6	15	7	3	198	1.23
Fractures, not specified—											
a. Arms and Legs	M.	2	....	....	....	....	....	....	....	2	.01
b. Femur	M.	1	2	....	....	....	....	....	....	3	.01
	F.	....	2	....	....	....	....	1	....	3	.01

c. Hip	M.	....	3	....	1	....	....	....	1	5	.03
	F.	1	3	1	2	....	1	....	....	8	.05
d. Neck	M.	....	1	....	....	....	1	....	....	2	.01
e. Ribs	M.	2	....	....	1	....	....	....	....	3	.01
f. Skull	M.	5	5	1	5	....	....	....	....	16	.10
	F.	2	2	....	1	....	....	....	....	5	.03
g. Vertebra	M.	1	2	1	3	....	....	....	....	7	.04
	F.	....	1	....	....	....	....	....	....	1	.00
Dislocations	M.	....	....	....	1	....	....	....	....	1	.00
Other Accidental Traumatisms	M.	15	19	2	6	2	1	1	3	49	.30
	F.	1	2	....	....	1	1	....	1	6	.03
a. Cerebral Concussion	M.	....	....	....	3	1	....	....	....	4	.02
	F.	....	....	....	1	....	....	....	....	1	.00
b. Fall	M.	15	25	8	14	4	8	4	1	79	.49
	F.	7	16	11	9	3	2	3	....	51	.31
c. Fall from pole	M.	1	....	....	....	....	....	....	....	1	.00
d. Fall from window	M.	5	1	1	....	....	....	....	....	7	.04
	F.	1	....	....	....	....	....	....	....	1	.00
e. Kick of Horse	M.	1	1	1	2	....	1	....	....	6	.03
f. Live Electric Wire	M.	....	....	....	1	....	....	....	....	1	.00
g. Railway, Steam	M.	35	37	10	53	5	4	3	1	148	.92
	F.	....	4	3	3	....	1	....	....	11	.06
h. Railway, Street	M.	7	9	3	2	3	....	....	....	24	.15
	F.	....	2	....	2	....	....	....	....	4	.02
i. Automobile, Accidents	M.	3	8	....	2	....	....	....	....	13	.08
	F.	1	....	....	3	....	....	....	....	4	.02
j. Injuries by Vehicle	M.	4	3	2	3	....	1	1	....	14	.08
	F.	....	1	1	....	....	....	....	....	2	.01
k. Gun Shot	M.	1	2	3	3	1	1	1	....	12	.07

TABLE VII—CONTINUED—1908.

CAUSES OF DEATH.		Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total, 1908.	Per cent. to Total Mortality.
Burns and Scalds	M.	6	9	6	11	1	1	2	1	37	.23
	F.	10	14	2	12	3	2	3	1	47	.29
Heat and Sunstroke	M.	3	3	----	1	1	3	1	1	13	.08
	F.	2	4	----	1	----	----	1	----	8	.05
Cold and Freezing	M.	1	----	----	1	----	3	----	----	5	.03
	F.	----	----	1	----	----	----	----	----	1	.00
Electric Shock	M.	2	----	----	2	----	----	----	----	4	.02
a. Lightning	M.	1	----	1	1	----	1	----	----	4	.02
	F.	----	1	----	----	----	----	----	----	1	.00
Accidental Drowning	M.	16	32	14	38	4	6	12	4	126	.78
	F.	1	5	3	3	----	1	2	1	16	.10
Starvation and Privation	F.	----	1	----	----	----	----	----	----	1	.00
Absorption of Deleterious Gases (Suicide excepted)	M.	3	11	----	3	2	----	----	----	19	.11
	F.	1	----	----	----	----	----	----	----	1	.00
Other Acute Poisonings	M.	4	10	5	4	2	1	2	----	28	.17
	F.	3	8	5	3	1	----	2	----	22	.13
Other External Violence—											
a. Suffocation	M.	4	4	2	3	1	1	----	----	15	.09
	F.	2	2	----	3	----	----	----	----	7	.04
b. Injuries at birth	M.	25	25	4	14	3	6	1	2	80	.50
	F.	5	13	6	9	3	3	----	1	40	.25

Capital Punishment—Execution	M.	3	....	....	....	....	....	....	....	3	.01
Homicides	M.	....	2	1	2	1	....	....	....	6	.03
	F.	1	3	1	1	1	....	....	2	9	.05
a. Gunshot	M.	3	4	....	2	....	....	....	1	10	.06
	F.	1	3	1	1	....	....	....	....	6	.03
b. Stab or Cut	M.	2	2	....	....	....	2	....	....	6	.03
Total from Violence		257	374	119	270	49	67	47	24	1207	7.54

Class XIV.—Ill-Defined Diseases.

Dropsy	M.	3	1	....	2	....	....	....	....	6	.03
	F.	....	....	....	....	....	1	....	....	1	.00
Inanition (over 3 months)	M.	2	3	....	3	....	1	....	....	9	.05
	F.	2	2	....	5	....	....	....	....	9	.05
Marasmus (over 3 months)	M.	19	13	5	14	1	2	1	2	57	.35
	F.	7	13	2	12	2	....	....	....	36	.22
Ill-defined	M.	3	24	1	....	1	1	....	....	30	.18
	F.	3	11	4	....	....	....	1	....	19	.11
Causes unknown	M.	15	7	1	1	....	3	....	3	30	.18
	F.	2	5	2	...	1	....	2	1	13	.08
Total Unspecified Causes		56	79	15	37	5	8	4	6	210	1.31
GRAND TOTAL		3271	4871	1466	3563	747	941	762	379	16000	100.00

TABLE VIII.

DEATHS IN TOWNS, ALPHABETICAL ARRANGEMENT, DISTINGUISHED BY AGE AND MONTH—1908.

TOWNS.	AGES.														January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Mo. not stated.	Males.	Females.	Sex not stated.	Total Deaths.	Total Births.
	Under 1 year.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	100 & over.	Unknown.																		
Andover	2	1	1	....	....	....	1	....	....	2	....	....	..	....	....	....	....	1	1	1	....	1	....	3	....	....	..	3	4	..	7	8
Ansonia	72	25	5	5	8	10	20	9	25	25	7	....	..	1	22	28	20	11	13	8	28	24	11	17	13	17	..	115	97	..	212	457
Ashford	2	....	....	....	....	....	....	1	3	6	3	....	..	....	2	4	2	1	1	....	1	....	2	1	1	....	..	8	7	..	15	18
Avon	1	1	....	....	1	1	1	2	1	....	3	1	..	....	2	....	3	1	....	....	3	....	....	2	1	....	..	7	5	..	12	24
Barkhamsted	1	1	....	....	1	3	1	1	1	4	1	....	..	....	1	....	1	....	....	....	1	1	2	2	2	4	..	8	6	..	14	10
Beacon Falls	3	2	....	....	2	1	2	1	1	....	....	....	..	1	....	2	1	1	2	3	2	....	....	....	1	1	..	10	3	..	13	35
Berlin	6	2	....	1	4	....	3	6	3	5	4	....	..	....	6	3	5	1	1	2	3	2	1	2	6	2	..	20	14	..	34	69
Bethany	3	....	....	....	1	....	....	....	1	3	2	....	..	....	1	....	....	....	3	1	3	....	....	1	1	....	..	7	3	..	10	9
Bethel	9	1	....	2	1	2	5	6	11	7	4	....	..	....	6	3	3	5	4	3	4	4	3	5	5	3	..	17	31	..	48	65
Bethlehem	....	....	....	....	....	....	....	....	1	3	1	....	..	....	....	....	....	1	....	1	....	....	1	2	....	....	..	2	3	..	5	8
Bloomfield	2	1	....	1	....	1	1	3	....	2	3	1	..	....	1	2	2	1	1	1	1	....	2	1	1	2	..	5	10	..	15	19
Bolton	....	1	....	....	....	....	1	1	1	1	....	....	..	....	1	1	....	1	....	....	....	1	....	....	....	1	..	2	3	..	5	11
Bozrah	1	....	....	....	....	1	1	3	2	1	....	....	..	....	....	1	1	....	....	1	2	1	....	....	1	2	..	6	3	..	9	15
Branford	18	10	1	2	5	4	7	4	7	11	8	2	..	1	1	3	10	13	4	5	9	9	6	6	7	7	..	45	35	..	80	172
Bridgeport	342	107	27	59	126	123	131	161	138	117	59	7	..	....	128	141	108	118	118	120	147	111	98	100	108	107	..	718	679	..	1397	2678
Bridgewater	....	1	....	....	....	1	....	2	2	5	1	....	..	....	....	2	....	....	1	....	4	1	1	2	1	....	..	6	6	..	12	9
Bristol	50	7	1	7	4	11	15	19	16	22	9	1	..	....	20	10	13	18	11	13	16	16	9	19	13	4	..	82	80	..	162	326
Brookfield	2	....	....	....	....	....	....	1	2	3	2	1	..	....	1	....	....	1	....	....	1	2	1	3	1	1	..	6	5	..	11	16
Brooklyn	6	....	1	1	1	2	3	....	5	8	7	....	..	....	4	3	1	4	2	3	2	1	3	3	5	3	..	19	15	..	34	40
Burlington	7	4	1	....	3	3	3	1	....	2	3	2	..	....	4	5	1	....	4	4	1	3	2	2	2	1	..	18	11	..	29	48
Canaan	2	....	....	....	2	2	....	1	2	2	2	....	..	....	....	4	1	1	....	....	2	1	1	....	2	1	..	7	6	..	13	13
Canterbury	....	....	1	....	....	....	2	....	....	2	2	....	..	....	....	1	1	1	....	2	1	....	....	....	....	1	..	4	3	..	7	10
Canton	7	2	2	1	2	3	2	6	5	6	6	....	..	....	11	3	1	4	3	3	4	2	4	2	2	3	..	27	15	..	42	63
Chaplin	....	....	....	....	1	....	....	1	1	2	....	....	..	....	1	1	2	....	....	....	....	....	....	....	....	1	..	2	3	..	5	15
Chatham	2	3	....	1	....	1	1	....	4	9	5	....	..	....	3	4	2	1	1	3	2	3	4	1	....	2	..	16	10	..	26	30
Cheshire	4	....	1	....	....	4	5	4	3	5	4	....	1	....	3	....	1	3	4	4	4	2	4	1	3	2	..	18	13	..	31	21
Chester	....	....	....	1	3	2	1	....	3	2	4	....	..	1	5	1	....	2	....	1	1	1	2	....	2	1	1	7	10	..	17	26
Clinton	1	....	....	....	....	....	2	....	2	1	5	....	..	....	....	....	1	1	1	....	1	3	....	4	....	....	..	5	6	..	11	24
Colchester	3	....	....	1	2	3	4	2	5	12	11	....	..	....	2	1	3	8	6	5	4	4	2	4	4	....	..	19	24	..	43	49
Colebrook	2	1	....	....	1	1	....	2	....	2	1	....	..	....	1	1	1	....	....	1	2	....	2	1	....	1	..	5	5	..	10	5
Columbia	....	....	....	....	....	....	1	2	1	2	4	....	..	....	2	1	4	....	....	1	1	1	....	....	....	....	..	5	5	..	10	12
Cornwall	5	....	....	1	1	....	1	1	4	6	2	....	..	....	1	2	4	....	2	2	....	3	3	1	2	1	..	11	10	..	21	17
Coventry	3	2	2	1	....	2	2	5	2	6	3	....	..	1	5	9	....	5	....	1	3	3	....	1	1	1	..	19	10	..	29	22
Cromwell	5	....	3	1	1	....	4	3	3	6	1	....	..	....	2	5	1	2	2	1	2	4	2	4	1	1	..	8	19	..	27	51
Danbury	45	11	4	15	25	33	45	49	45	43	19	5	1	....	32	33	24	32	26	30	35	39	20	19	26	24	..	180	160	..	340	465
Darien	2	3	....	4	1	5	2	7	28	36	17	3	..	....	16	18	7	5	6	6	5	9	9	7	7	5	..	86	17	..	108	66

Eastford	2	....	1	....	....	1	....	....	1	1	3	....	..	....	1	2	....	....	1	2	1	....	....	2	....	....	..	5	4	..	9	9
Easton	2	....	....	....	....	2	1	1	2	4	1	....	1	....	2	1	....	....	1	1	1	....	3	1	1	3	..	4	10	..	14	14
East Granby	1	....	....	....	....	1	....	....	1	1	3	....	..	1	1	....	1	1	....	....	1	1	....	....	3	....	..	4	4	..	8	15
East Haddam	5	1	1	2	2	1	3	5	6	11	2	....	..	....	5	1	1	4	8	8	1	2	2	6	2	4	..	20	19	..	39	41
East Hartford	9	7	2	1	6	7	4	9	16	10	8	8	..	....	11	5	8	7	5	6	7	2	7	9	9	6	..	38	44	..	82	175
East Haven	3	1	....	....	2	....	2	2	2	6	1	....	..	....	2	2	....	....	3	2	2	3	1	....	4	....	..	9	10	..	19	88
East Lyme	5	1	....	....	2	1	1	7	3	9	4	....	..	....	3	6	3	1	3	2	1	4	3	1	1	5	..	12	21	..	33	42
East Windsor	9	1	....	5	2	2	4	6	6	10	5	....	..	....	2	5	5	3	3	5	4	9	2	3	4	5	..	25	25	..	50	71
Ellington	2	1	....	....	3	2	....	3	6	3	7	....	..	1	1	2	3	2	4	1	4	5	2	....	1	3	..	16	12	..	28	41
Enfield	48	14	1	1	1	7	6	9	12	16	7	2	..	....	11	10	10	11	8	8	8	18	18	6	7	14	..	62	62	..	124	282
Essex	8	....	....	1	8	....	8	2	4	8	2	1	..	....	1	2	1	3	1	4	7	2	....	3	5	3	..	16	16	..	32	69
Fairfield	22	5	1	1	1	2	4	9	7	10	10	2	..	2	6	6	5	6	6	6	9	7	7	7	8	8	..	37	39	..	76	98
Farmington	8	1	....	....	2	8	4	4	6	9	6	1	..	....	7	4	4	4	4	....	1	6	2	4	5	3	..	20	24	..	44	51
Franklin	....	....	....	1	1	1	1	1	4	1	1	....	..	....	1	2	1	1	....	1	....	1	1	2	....	1	..	6	5	..	11	6
Glastonbury	8	6	8	1	4	4	8	5	9	8	11	1	1	....	10	9	7	5	5	6	4	4	3	3	4	4	..	31	33	..	64	108
Goshen	1	....	....	....	....	....	....	....	3	1	1	....	..	....	....	....	1	1	....	....	1	....	1	2	....	....	..	3	3	..	6	9
Granby	5	....	1	1	1	1	....	2	....	5	....	....	..	....	2	1	1	2	3	1	1	1	2	....	....	2	..	8	8	..	16	20
Greenwich	63	19	4	12	17	16	27	18	42	35	20	4	..	....	30	26	21	15	24	17	29	28	33	21	13	20	..	145	132	..	277	299
Griswold	16	4	4	2	3	7	2	9	9	7	5	....	..	....	7	16	6	4	6	7	1	7	4	3	3	4	..	30	38	..	68	122
Groton	16	5	1	4	8	7	6	9	16	22	23	8	..	1	11	9	10	10	9	10	14	9	12	10	8	9	..	66	55	..	121	146
Guilford	5	6	1	1	4	8	....	4	8	6	8	2	..	....	4	2	5	3	2	7	3	3	....	4	4	6	..	21	22	..	43	46
Haddam	12	2	1	....	2	1	3	1	1	4	7	....	..	....	3	....	4	4	5	1	3	4	3	3	1	3	..	18	16	..	34	43
Hamden	17	5	....	1	6	3	6	3	7	11	4	....	..	1	7	7	5	8	6	5	6	5	5	4	2	4	..	28	36	..	64	132
Hampton	3	....	....	....	....	....	....	....	3	2	1	....	..	1	....	2	....	2	....	....	1	2	....	1	1	1	..	7	3	..	10	12
Hartford	264	84	31	58	127	150	166	155	188	161	62	11	1	1	124	126	165	131	100	98	137	112	103	115	112	135	1	814	645	..	1459	2369
Hartland	2	....	....	....	1	1	1	....	....	2	3	....	..	....	....	2	1	1	....	....	....	....	3	....	3	....	..	8	2	..	10	12
Harwinton	6	....	....	2	2	1	1	1	4	2	....	1	..	....	3	3	1	3	3	1	2	....	1	1	1	1	..	9	11	..	20	49
Hebron	2	1	1	....	....	....	....	....	2	1	4	1	..	1	1	2	1	1	....	1	2	1	1	1	2	....	..	7	6	..	13	26
Huntington	24	5	2	2	2	4	6	8	11	9	5	1	..	....	10	4	9	6	8	....	11	4	7	6	6	8	..	43	36	..	79	144
Kent	1	....	....	....	....	....	1	2	....	3	2	....	..	....	1	1	2	1	....	2	....	2	....	....	....	....	..	6	3	..	9	24
Killingly	26	6	....	2	5	13	6	6	19	21	15	4	..	1	18	12	15	11	8	5	8	10	11	21	3	12	..	64	60	..	124	155
Killingworth	1	1	....	....	....	1	....	....	1	....	2	....	..	....	....	....	1	....	....	1	....	2	1	....	....	1	..	2	4	..	6	15
Lebanon	1	....	....	1	1	1	2	3	5	4	4	....	..	....	1	2	....	1	1	1	3	....	2	6	4	1	..	9	13	..	22	26
Ledyard	....	....	....	1	....	1	3	1	2	3	3	1	..	....	2	....	3	1	1	1	....	....	2	2	2	1	..	9	6	..	15	11
Lisbon	2	2	....	2	1	2	1	1	3	1	3	....	..	....	1	1	3	2	....	2	2	2	1	....	1	3	..	13	5	..	18	14
Litchfield	5	....	2	2	4	3	5	4	10	2	7	1	..	....	8	8	8	8	8	4	1	3	6	5	2	4	..	28	17	..	45	57
Lyme	1	....	....	1	....	....	4	1	1	....	2	1	..	....	....	....	....	2	....	2	2	1	1	2	1	....	..	6	5	..	11	9
Madison	2	....	....	....	4	1	....	2	4	6	4	1	..	....	2	3	3	1	1	....	4	2	3	1	2	2	..	9	15	..	24	26
Manchester	23	1	1	6	7	6	14	8	17	22	8	....	..	....	8	12	11	12	9	8	12	9	14	9	5	4	..	64	49	..	113	296
Mansfield	3	1	....	2	1	1	1	3	5	5	4	....	..	....	2	5	3	2	1	1	1	4	2	1	1	3	..	14	12	..	26	39
Marlborough	....	....	....	1	....	....	....	....	1	2	....	....	..	....	....	1	....	1	1	....	....	....	....	....	....	1	..	3	1	..	4	2
Meriden	89	25	4	11	37	33	46	44	70	50	27	4	..	....	43	36	37	45	31	33	39	41	35	22	39	39	..	235	205	..	440	766
Middlebury	1	....	....	1	1	2	1	....	1	3	1	....	..	....	....	1	2	....	3	1	....	1	1	....	1	1	..	6	5	..	11	20
Middlefield	5	....	....	....	1	....	....	1	2	2	....	1	..	....	....	1	1	....	1	1	2	2	....	1	2	1	..	3	9	..	12	30
Middletown	57	16	2	15	40	39	33	58	64	71	33	8	..	....	50	33	31	35	44	33	49	28	41	34	27	31	..	226	210	..	436	510
Milford	9	3	2	....	3	4	5	12	11	15	9	3	..	1	5	10	5	5	7	4	5	11	7	8	6	8	1	43	34	..	77	64
Monroe	1	....	....	....	1	....	1	....	2	4	1	....	..	1	1	....	2	1	1	....	1	2	1	1	....	1	..	7	4	..	11	11
Montville	9	1	1	....	....	1	....	6	4	9	8	1	..	....	4	3	3	5	2	3	1	2	3	4	4	6	..	25	15	..	40	42

TABLE VIII—CONTINUED—1908.

TOWNS.	AGES. Under 1 year.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	100 & over.	Unknown.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Mo. not stated.	Males.	Females.	Sex not stated.	Total Deaths.	Total Births.
Morris	1	----	----	----	2	1	1	----	----	3	1	----	--	----	1	----	2	2	----	----	1	1	----	----	2	----	--	3	6	--	9	7
Naugatuck	35	15	3	5	6	10	5	14	15	7	5	2	--	----	12	15	15	4	9	10	11	11	5	9	12	9	--	65	57	--	122	372
New Britain	193	53	13	20	37	37	42	42	55	29	24	2	--	1	60	43	51	35	31	34	45	69	55	32	48	45	--	307	241	--	548	1289
New Canaan	2	1	----	2	2	8	1	5	6	10	5	1	--	----	3	2	2	7	3	2	5	4	5	4	2	4	--	25	18	--	43	61
New Fairfield	2	----	----	----	----	----	1	1	2	2	3	2	--	----	2	3	----	----	----	1	----	2	1	3	----	1	--	8	5	--	13	7
New Hartford	3	2	1	1	----	1	----	6	5	6	4	----	--	----	3	3	4	2	3	1	2	2	3	1	2	3	--	16	13	--	29	38
New Haven	391	156	49	75	160	200	201	239	270	232	131	15	--	2	200	206	202	181	157	175	184	151	150	151	165	199	--	1158	963	--	2121	3533
Newington	3	3	----	1	----	1	----	3	2	4	1	----	--	----	----	7	2	----	2	----	1	2	----	1	1	2	--	9	9	--	18	29
New London	54	19	8	6	30	26	31	33	45	34	17	7	1	7	22	34	36	26	32	21	25	32	30	17	17	25	1	153	165	--	318	516
New Milford	14	3	3	2	2	2	9	6	6	15	8	1	--	----	9	7	9	3	1	5	2	8	7	9	5	6	--	40	31	--	71	125
Newtown	1	----	----	----	1	3	7	2	13	9	11	----	--	----	10	5	2	7	2	4	4	5	3	2	2	1	--	25	22	--	47	44
Norfolk	3	2	----	1	1	1	1	2	7	4	2	----	--	----	3	1	2	2	----	2	3	5	3	----	----	3	--	11	13	--	24	30
North Branford	1	----	----	2	----	1	2	2	2	4	2	3	--	----	1	2	1	2	2	1	2	3	2	---	2	1	--	11	8	--	19	11
North Canaan	4	----	----	----	1	1	1	5	5	3	2	----	--	----	2	2	4	1	2	3	1	----	1	1	1	4	--	14	8	--	22	48
North Haven	5	2	----	1	2	----	2	3	3	10	4	----	--	----	1	1	5	2	3	2	4	----	3	1	3	7	--	18	14	--	32	56
North Stonington	2	----	2	----	1	----	1	2	7	6	3	1	--	----	3	4	2	5	1	2	3	----	1	----	2	2	--	17	8	--	25	16
Norwalk	59	18	8	16	32	22	34	36	49	61	28	3	--	----	31	48	29	33	30	25	31	31	35	20	24	29	--	186	180	--	366	433
Norwich	72	18	10	17	29	33	44	49	78	57	33	6	--	----	38	41	38	37	30	35	36	58	30	43	29	31	--	216	230	--	446	608
Old Lyme	1	----	1	----	----	1	1	1	2	4	5	----	--	----	----	1	1	3	----	1	1	3	2	----	----	4	--	9	7	--	16	22
Old Saybrook	2	----	----	1	1	2	----	1	4	2	2	2	--	----	----	1	1	3	----	2	3	3	2	2	----	----	--	8	9	--	17	28
Orange	17	2	2	5	9	10	8	6	22	18	13	----	--	1	15	12	7	9	4	10	14	3	7	10	3	18	1	59	54	--	113	168
Oxford	----	1	1	----	1	1	----	3	1	1	1	1	--	----	1	1	----	----	1	2	2	----	2	1	1	----	--	8	3	--	11	14
Plainfield	20	6	----	2	1	6	3	9	12	12	3	----	--	----	10	11	9	4	4	2	5	11	4	5	5	4	--	32	42	--	74	145
Plainville	2	1	1	1	1	5	1	5	6	4	3	1	--	----	3	3	4	2	----	2	3	2	3	1	2	6	--	18	13	--	31	50
Plymouth	18	3	1	3	3	2	2	---	10	1	4	----	--	----	4	1	4	3	1	7	2	3	10	5	2	5	--	19	28	--	47	158
Pomfret	2	1	----	----	1	----	----	2	1	5	3	----	--	----	1	1	----	----	2	2	1	1	2	1	1	3	--	9	6	--	15	44
Portland	14	1	1	1	1	6	3	3	5	12	5	----	--	----	5	5	4	7	4	2	6	6	8	4	1	----	--	37	15	--	52	79
Preston	1	----	----	----	2	4	10	2	7	11	8	----	--	----	5	8	4	7	2	2	3	1	4	2	3	4	--	23	22	--	45	12
Prospect	----	----	----	----	1	----	----	----	2	----	----	----	--	----	---	----	----	1	1	----	----	----	----	1	----	----	--	2	1	--	3	6
Putnam	20	2	2	6	7	7	9	11	12	12	13	4	--	----	18	11	6	9	3	6	8	7	11	10	8	8	--	53	51	1	105	157
Redding	2	----	1	----	3	5	1	2	2	1	1	1	--	----	1	----	3	4	1	1	1	1	----	3	3	1	--	15	4	--	19	22
Ridgefield	5	4	1	----	1	1	----	1	4	10	5	----	--	----	1	1	4	1	5	3	7	8	1	1	----	----	--	16	16	--	32	57
Rocky Hill	1	1	----	----	----	1	1	1	1	4	4	----	--	----	3	1	----	2	----	2	2	2	----	1	----	1	--	6	8	--	14	24
Roxbury	2	----	----	----	1	----	2	3	2	3	2	----	--	----	1	----	1	3	----	3	1	2	2	----	----	2	--	9	6	--	15	27
Salem	1	----	----	----	----	----	----	----	----	2	----	1	--	----	----	----	----	----	3	----	----	----	----	1	----	----	--	2	2	--	4	12
Salisbury	8	3	2	10	8	10	3	6	4	3	3	1	--	1	3	6	4	7	5	10	3	8	5	3	4	4	--	35	27	--	62	44

Scotland	2	1	-	-	-	-	1	1	1	-	2	-	-	-	-	2	2	-	-	1	-	2	1	-	-	-	-	3	5	-	8	12
Seymour	16	5	-	1	5	4	2	10	7	8	4	1	-	-	6	6	5	3	7	6	6	4	2	8	3	7	-	28	35	-	63	140
Sharon	2	-	-	-	2	3	2	1	6	4	4	3	-	-	4	-	3	3	-	-	3	3	1	5	2	3	-	16	11	-	27	35
Sherman	1	-	-	1	-	2	-	-	2	2	1	-	-	-	-	1	2	-	-	2	4	-	-	-	-	-	-	4	5	-	9	8
Simsbury	5	3	1	1	2	3	2	4	6	9	3	-	-	2	6	5	4	-	4	1	4	5	3	4	3	2	-	13	28	-	41	52
Somers	4	1	-	1	1	4	-	2	1	4	5	-	-	-	4	-	4	4	-	1	2	2	-	1	2	3	-	9	14	-	23	33
Southbury	2	-	1	-	3	2	-	1	2	4	1	2	-	-	2	5	1	1	1	1	1	1	2	2	1	-	-	10	8	-	18	20
Southington	15	4	1	2	5	3	3	7	5	16	10	1	-	-	7	5	7	5	6	6	5	5	11	4	6	5	-	33	39	-	72	160
South Windsor	1	1	-	1	2	2	3	3	2	4	3	-	-	-	8	1	1	-	4	2	-	2	-	2	-	1	1	11	11	-	22	48
Sprague	15	3	2	2	2	3	1	1	5	2	3	-	-	-	3	2	3	4	2	5	7	2	5	4	1	1	-	23	16	-	39	52
Stafford	20	-	2	4	4	2	5	6	9	18	3	-	-	-	8	8	5	7	5	4	8	6	9	3	7	3	-	39	34	-	73	184
Stamford	96	40	7	8	25	37	43	44	53	48	29	4	-	4	62	38	33	27	30	37	48	40	31	39	32	21	-	233	205	-	438	921
Sterling	2	-	1	1	1	-	-	3	4	4	3	1	-	-	1	1	2	2	-	-	2	3	-	3	2	4	-	9	11	-	20	40
Stonington	30	16	4	2	3	4	14	6	21	19	13	2	-	-	13	15	15	19	13	6	8	12	12	8	7	6	-	62	72	-	134	202
Stratford	19	9	3	5	5	6	2	7	7	15	6	2	-	-	10	5	11	8	8	5	10	9	5	6	5	4	-	44	42	-	86	95
Suffield	14	8	-	2	1	-	4	4	3	13	6	1	-	1	9	9	7	1	2	-	7	10	5	3	2	2	-	28	29	-	57	92
Thompson	20	3	-	3	7	6	6	5	4	11	4	2	-	-	3	2	9	7	9	2	6	5	7	10	5	6	-	38	33	-	71	187
Thomaston	11	1	-	1	1	2	2	4	5	11	3	-	-	-	5	2	2	6	1	4	4	4	1	7	1	4	-	24	17	-	41	98
Tolland	-	2	1	1	2	1	1	2	2	2	6	1	-	-	2	1	2	5	5	-	-	1	-	1	2	2	-	10	11	-	21	21
Torrington	64	21	5	5	18	7	3	12	19	15	10	3	-	-	16	18	17	18	17	18	15	24	10	10	3	16	-	89	93	-	182	445
Trumbull	2	3	-	-	-	2	1	3	1	5	6	-	-	1	1	6	2	3	1	2	2	3	-	2	1	1	-	14	10	-	24	22
Union	1	-	1	-	-	-	-	-	2	3	-	-	-	-	2	-	-	-	-	1	1	1	-	1	-	1	-	3	4	-	7	11
Vernon	24	7	1	6	1	5	7	10	22	22	8	4	-	1	10	12	11	6	11	7	9	11	11	9	9	12	-	59	59	-	118	197
Voluntown	2	-	1	-	1	-	1	3	1	1	1	-	-	-	-	1	-	2	-	-	1	3	1	-	1	2	-	9	2	-	11	13
Wallingford	33	19	1	4	15	5	10	14	14	15	12	1	-	2	11	9	19	14	13	9	20	14	15	7	3	11	-	85	60	-	145	298
Warren	2	1	-	-	1	-	1	1	-	-	1	1	-	-	1	1	-	-	-	1	1	-	-	2	-	2	-	6	2	-	8	8
Washington	1	-	-	2	2	2	3	6	3	9	5	-	-	-	1	2	7	3	3	-	2	3	7	1	2	2	-	23	10	-	33	30
Waterbury	276	122	29	40	81	94	92	96	105	80	33	8	-	-	108	88	93	74	89	55	122	88	90	82	92	75	-	577	478	1	1056	2108
Waterford	6	3	1	1	2	2	4	1	7	3	6	-	-	1	8	2	3	4	3	2	3	4	2	1	1	4	-	22	15	-	37	52
Watertown	9	7	-	3	2	4	5	5	6	6	2	2	-	-	3	5	7	3	4	6	5	2	6	2	5	3	-	24	27	-	51	79
Westbrook	2	-	-	1	-	1	-	1	2	10	3	1	-	-	3	3	2	1	1	1	1	5	-	2	1	1	-	11	10	-	21	14
West Hartford	8	2	1	-	1	1	3	8	15	13	11	3	-	-	6	9	5	8	9	3	2	2	7	6	2	7	-	28	38	-	66	78
Weston	-	-	-	-	-	-	2	2	4	3	2	1	-	-	2	2	1	1	-	1	-	2	-	1	3	1	-	6	8	-	14	10
Westport	11	2	1	3	5	11	10	15	10	18	6	1	-	-	8	12	13	8	6	5	9	9	2	8	7	6	-	43	50	-	93	59
Wethersfield	3	-	1	2	4	3	7	1	5	5	3	-	-	-	3	1	2	5	2	4	2	1	2	4	3	5	-	24	10	-	34	44
Willington	6	2	-	-	1	2	-	2	3	1	2	-	-	-	-	2	1	1	1	-	3	5	1	2	2	1	-	5	14	-	19	27
Wilton	2	-	-	-	1	3	2	2	2	4	6	1	-	-	-	4	6	5	2	-	-	4	1	-	-	1	-	14	9	-	23	32
Winchester	16	6	1	5	11	9	9	11	21	26	11	4	-	-	13	10	13	5	14	14	11	16	7	7	7	13	-	75	55	-	130	192
Windham	45	8	2	7	16	10	17	24	25	35	17	3	-	1	23	23	11	18	9	11	32	18	12	22	12	19	-	101	109	-	210	267
Windsor	19	2	2	-	2	8	2	3	8	11	3	-	-	-	3	7	3	3	9	2	4	8	5	6	7	3	-	33	27	-	60	96
Windsor Locks	18	3	-	2	-	-	3	5	5	4	-	-	-	-	3	3	3	5	2	2	3	5	5	3	4	2	-	23	17	-	40	104
Wolcott	6	-	1	-	-	-	1	-	1	3	2	-	-	-	1	3	1	-	1	1	-	3	-	3	1	-	-	7	7	-	14	16
Woodbridge	-	-	1	-	-	-	-	2	1	3	2	2	-	-	1	2	1	-	4	-	1	-	1	-	-	1	-	4	7	-	11	22
Woodbury	1	1	-	-	1	-	2	7	3	7	11	2	-	-	2	1	4	2	4	3	3	1	2	2	1	10	-	22	13	-	35	25
Woodstock	2	4	1	3	-	4	1	3	2	13	4	3	-	-	5	6	5	4	4	2	3	2	2	3	3	1	-	21	19	-	40	32
Total	3251	1038	297	546	1090	1227	1366	1605	2045	2096	1199	191	6	43	1557	1515	1456	1330	1204	1146	1496	1410	1240	1215	1144	1280	7	8485	7513	2	16000	26694

TABLE IX.

DEATHS AND BIRTHS IN TOWNS, ALPHABETICAL ARRANGEMENT, DISTINGUISHED BY NATIONALITY—1908.

TOWNS.	DEATHS. Nativity of Decedents. Connecticut.	Other States.	England.	Ireland.	Scotland.	Canada.	Germany.	Italy.	France.	Sweden.	Russia.	Other For. Countries.	Total Native Decedents.	Total Foreign Decedents.	Nativity Unknown.	Total of all Nations.	BIRTHS. Nativity of Parents. Both Par. of U. S.	Each of Dif. Nat.	Both Par. English.	Irish.	Scotch.	Canadian.	German.	Italian.	French.	Swedish.	Russian.	Other For. Countries.	Parentage Unknown.	Total Births.
Andover	6	....	....	....	....	....	....	....	....	1	....	....	6	1	....	7	8	....	....	....	....	....	....	....	....	....	....	....	....	8
Ansonia	131	20	14	21	2	3	2	1	....	3	4	8	151	58	3	212	96	78	5	33	2	3	6	45	....	8	81	99	1	457
Ashford	9	5	1	....	....	....	....	....	....	....	....	....	14	1	....	15	12	1	....	....	....	....	2	....	....	....	....	3	....	18
Avon	6	....	1	....	....	....	5	....	....	....	....	....	6	6	....	12	8	4	....	....	....	2	1	2	....	1	3	2	1	24
Barkhamsted	11	2	....	....	....	....	....	....	....	....	....	....	13	....	1	14	9	....	....	....	....	....	....	....	....	....	....	1	....	10
Beacon Falls	6	1	....	2	....	....	....	1	....	....	....	2	7	5	1	13	11	7	....	2	....	....	1	1	....	....	7	6	....	35
Berlin	20	2	....	4	....	....	3	2	....	2	....	1	22	12	....	34	37	9	....	....	1	....	1	13	....	4	1	2	1	69
Bethany	7	1	....	1	....	....	....	....	....	....	....	....	8	1	1	10	6	....	....	....	....	....	1	2	....	....	....	....	....	9
Bethel	25	11	....	9	....	....	1	....	....	....	....	....	36	10	2	48	49	5	....	2	....	....	2	2	....	1	1	....	3	65
Bethlehem	3	1	1	....	....	....	....	....	....	....	....	....	4	1	....	5	4	2	....	....	....	....	....	....	....	1	1	....	....	8
Bloomfield	12	1	....	....	....	....	1	....	....	....	....	1	13	2	....	15	10	2	....	1	....	....	....	....	....	....	2	....	4	19
Bolton	1	1	....	....	....	....	1	1	....	....	....	1	2	3	....	5	4	2	....	....	....	....	1	2	....	....	....	1	1	11
Bozrah	5	....	....	2	....	....	....	....	....	1	1	....	5	4	....	9	5	3	....	1	....	....	....	....	....	....	5	1	....	15
Branford	52	7	1	7	....	1	3	2	....	1	....	5	59	20	1	80	41	34	2	3	1	....	1	27	....	4	25	33	1	172
Bridgeport	769	201	39	155	10	20	35	21	1	15	20	85	970	401	26	1397	671	342	37	115	6	17	37	365	2	57	212	792	20	2673
Bridgewater	10	....	....	2	....	....	....	....	....	....	....	....	10	2	....	12	4	1	....	....	....	....	....	1	....	....	....	3	....	9
Bristol	104	15	3	8	1	7	7	1	....	5	6	4	119	42	1	162	91	38	3	15	....	16	19	67	....	10	45	22	....	326
Brookfield	7	2	....	....	....	....	....	1	....	....	....	....	9	1	1	11	12	1	....	....	....	....	....	....	....	1	....	2	....	16
Brooklyn	18	6	....	....	....	9	....	....	....	1	....	....	24	10	....	34	11	12	....	1	....	15	....	....	....	1	....	....	....	40
Burlington	22	3	1	....	....	....	2	....	....	....	1	....	25	4	....	29	11	4	....	....	....	....	5	2	....	....	4	22	....	48
Canaan	5	3	....	2	....	....	1	1	....	....	....	....	8	4	1	13	10	2	....	....	....	....	....	1	....	....	....	....	....	13
Canterbury	4	....	....	2	....	....	....	....	....	....	....	1	4	3	....	7	8	2	....	....	....	....	....	....	....	....	....	....	....	10
Canton	24	10	1	....	....	1	1	....	....	3	....	1	34	7	1	42	25	11	....	....	....	3	5	1	1	6	3	6	2	63
Chaplin	1	3	....	....	1	....	....	....	....	....	....	....	4	1	....	5	·10	3	....	1	....	1	....	....	....	....	....	....	....	15
Chatham	18	2	1	3	....	....	....	....	....	1	....	1	20	6	....	26	16	5	....	....	....	....	3	1	....	4	....	1	....	30
Cheshire	20	7	1	2	....	....	1	....	....	....	....	....	27	4	....	31	14	4	....	....	....	....	1	2	....	....	....	....	....	21
Chester	8	4	....	1	....	....	....	1	....	1	....	1	12	4	1	17	18	2	....	....	....	....	....	5	....	1	....	....	....	26
Clinton	10	....	....	....	....	....	....	....	....	....	....	....	10	....	1	11	17	5	....	....	....	....	1	1	....	....	....	....	....	24
Colchester	19	9	....	11	....	....	1	....	....	....	3	....	28	15	....	43	12	2	....	....	....	....	....	1	1	....	28	5	....	49
Colebrook	4	3	....	1	....	....	....	....	....	....	....	1	7	2	1	10	3	2	....	....	....	....	....	....	....	....	....	....	....	5
Columbia	7	....	....	....	....	2	....	....	....	....	....	....	7	2	1	10	7	1	....	....	....	1	2	....	....	....	1	....	....	12
Cornwall	13	3	....	1	....	....	2	....	....	....	....	....	16	3	2	21	10	1	....	....	....	....	....	2	....	....	1	2	1	17
Coventry	21	4	1	....	....	2	....	....	....	....	....	....	25	3	1	29	15	1	....	....	....	....	1	....	....	....	....	4	1	22
Cromwell	14	2	1	3	....	....	4	1	....	1	....	1	16	11	....	27	16	12	....	1	....	....	2	9	....	7	3	1	....	51
Danbury	158	76	10	48	....	2	13	10	1	1	2	12	234	99	7	340	232	60	8	13	....	2	3	70	....	5	13	54	5	465

Derby	78	10	----	28	1	1	8	4	----	----	----	4	83	30	----	119	52	48	1	6	2	----	2	108	----	1	15	95	2	827
Durham	10	1	----	1	----	----	----	----	----	----	----	----	11	1	----	12	9	3	----	----	----	----	---	3	----	----	----	1	----	16
Eastford	6	2	----	----	----	1	----	----	----	----	----	----	8	1	----	9	8	----	----	----	----	----	----	----	----	----	----	1	----	9
Easton	12	2	----	----	----	----	----	----	----	----	----	----	14	----	----	14	7	8	----	----	----	----	----	----	----	----	1	2	1	14
East Granby	5	1	----	----	----	----	1	----	----	----	----	----	6	1	1	8	11	8	----	----	----	----	----	----	----	----	----	1	----	15
East Haddam	27	2	8	----	----	----	----	1	----	----	1	8	29	8	2	39	15	4	----	----	----	----	----	1	----	----	4	17	----	41
East Hartford	51	18	1	4	1	----	9	1	----	----	----	1	64	17	1	82	108	85	2	8	----	8	1	7	----	5	1	5	----	175
East Haven	12	4	----	2	----	----	----	----	----	----	----	----	16	2	1	19	16	5	----	1	----	----	2	7	----	1	----	1	----	38
East Lyme	28	4	1	----	1	----	1	----	----	----	1	----	27	4	2	33	24	6	1	----	----	----	----	2	----	----	8	6	----	42
East Windsor	31	5	1	6	----	----	7	----	----	----	----	----	36	14	----	50	26	20	2	----	----	1	7	----	----	----	10	5	----	71
Ellington	16	5	1	2	----	----	1	----	----	----	----	----	23	4	1	28	18	5	----	1	----	----	5	5	----	----	7	5	----	41
Enfield	75	14	4	20	2	2	5	1	----	----	----	----	89	34	1	124	68	85	2	2	----	18	2	58	----	----	14	82	1	282
Essex	26	8	1	2	----	----	----	----	----	----	----	----	29	3	----	32	34	9	----	----	----	----	1	11	----	18	1	----	----	69
Fairfield	48	6	1	10	----	----	1	----	1	1	----	4	54	18	4	76	40	12	2	1	2	----	1	5	----	4	6	22	1	98
Farmington	24	5	4	5	1	----	8	----	----	1	1	----	29	15	----	44	20	11	----	2	1	1	2	5	----	8	----	5	1	51
Franklin	5	2	----	3	----	----	1	----	----	----	----	----	7	4	----	11	4	1	----	----	----	----	----	----	----	1	----	----	----	6
Glastonbury	37	7	1	6	----	----	8	3	1	----	----	5	44	19	1	64	38	14	----	2	----	----	1	18	1	----	7	22	----	103
Goshen	6	----	----	----	----	----	----	----	----	----	----	----	6	----	----	6	6	2	----	1	----	----	----	----	----	----	----	----	----	9
Granby	18	1	----	1	----	----	----	----	----	----	----	----	14	1	1	16	12	1	----	----	----	----	----	----	----	1	2	3	1	20
Greenwich	125	70	6	29	3	4	11	9	----	3	2	9	195	76	6	277	148	57	2	9	5	3	5	29	----	5	12	27	2	299
Griswold	36	9	6	6	1	5	----	----	----	----	2	1	45	21	2	68	84	32	3	1	1	16	----	1	----	----	12	21	1	122
Groton	78	24	2	6	1	2	1	3	----	----	----	2	102	17	2	121	89	22	----	5	----	14	2	11	----	----	1	2	----	146
Guilford	33	5	----	----	----	----	----	2	----	----	----	1	38	3	2	48	28	9	----	2	----	----	3	8	----	----	----	1	----	46
Haddam	25	4	2	----	----	----	1	----	----	1	----	1	29	5	----	34	15	4	----	1	----	----	1	3	----	6	---	12	1	48
Hamden	38	9	4	4	----	1	3	1	1	----	----	2	47	16	1	64	54	10	1	----	----	1	3	51	1	1	----	9	1	182
Hampton	5	1	1	1	----	1	----	----	----	----	----	----	6	3	1	10	9	2	----	----	----	----	----	----	----	----	----	----	1	12
Hartford	788	243	84	207	14	23	44	37	3	20	36	42	981	460	18	1459	818	388	14	202	11	23	43	357	4	95	287	124	3	2369
Hartland	7	3	----	----	----	----	----	----	----	----	----	----	10	----	----	10	8	1	----	----	----	----	1	----	----	----	----	----	2	12
Harwinton	14	2	----	----	1	----	----	2	----	----	----	----	16	3	1	20	11	8	----	1	----	----	1	18	----	3	2	5	----	49
Hebron	11	1	----	1	----	----	----	----	----	----	----	----	12	1	----	13	15	5	----	----	----	----	1	4	----	----	----	1	----	26
Huntington	51	10	4	4	1	1	3	2	----	----	----	1	61	16	2	79	62	25	5	1	----	----	6	9	----	2	3	30	1	144
Kent	7	2	----	----	----	----	----	----	----	----	----	----	9	----	----	9	16	2	----	----	----	----	1	----	----	2	----	3	----	24
Killingly	67	33	3	5	1	10	----	1	----	----	----	1	100	21	3	124	59	42	----	4	33	1	----	2	1	1	5	7	----	155
Killingworth	4	----	----	----	----	----	1	----	----	----	----	1	4	2	----	6	2	4	----	----	----	1	4	1	----	----	----	3	----	15
Lebanon	14	6	----	1	----	----	----	----	----	----	----	----	20	1	1	22	14	5	---	----	----	----	----	----	----	1	4	2	----	26
Ledyard	13	1	----	----	----	1	----	----	----	----	----	----	14	1	----	15	5	1	----	1	----	----	----	----	----	1	----	----	3	11
Lisbon	11	4	1	1	----	1	----	----	----	----	----	----	15	3	----	18	6	3	----	----	----	2	1	----	----	----	----	1	1	14
Litchfield	24	10	1	8	----	----	----	----	----	1	----	1	34	11	----	45	41	9	----	----	----	----	----	2	----	----	----	5	----	57
Lyme	7	1	----	1	----	----	----	----	----	----	1	1	8	3	----	11	7	2	----	----	----	----	----	----	----	----	----	----	----	9
Madison	18	5	----	1	----	----	4	----	----	----	----	1	18	6	----	24	9	7	----	----	----	----	5	3	----	----	----	2	----	26
Manchester	58	10	3	27	3	----	2	----	2	5	----	2	68	44	1	113	91	68	1	46	----	1	14	16	7	28	11	13	----	296
Mansfield	14	7	2	----	----	----	1	----	----	----	----	2	21	5	----	26	21	10	----	----	----	----	1	----	----	1	1	3	2	39
Marlborough	2	----	----	----	----	----	2	----	----	----	----	----	2	2	----	4	1	1	----	----	----	----	----	----	----	----	----	----	----	2
Meriden	236	49	18	52	----	15	39	7	2	2	3	15	285	153	2	440	205	156	11	16	----	22	64	90	3	15	46	135	3	766
Middlebury	5	2	----	1	----	----	1	----	----	1	----	----	7	3	1	11	14	3	----	----	----	----	2	1	----	----	----	----	----	20
Middlefield	8	2	1	1	----	----	----	----	----	----	----	----	10	2	----	12	14	6	1	----	----	----	----	----	----	1	----	8	----	30
Middletown	234	57	12	65	5	4	11	10	3	8	7	12	291	137	3	436	156	67	1	18	----	1	6	163	----	17	54	31	1	510
Milford	43	17	3	2	1	----	3	----	----	----	4	1	60	14	3	77	36	8	----	----	----	----	----	6	----	1	7	6	----	64
Monroe	7	1	1	1	----	----	----	----	----	----	----	1	8	3	----	11	6	----	----	----	----	----	1	----	----	----	2	----	2	11
Montville	29	3	----	4	----	1	----	----	----	1	2	----	32	3	----	40	19	6	1	1	----	6	2	----	----	----	4	3	----	42

TABLE IX—CONTINUED—1908.

TOWNS.	DEATHS.																BIRTHS.													
	NATIVITY OF DECEDENTS.																NATIVITY OF PARENTS.													
	Connecticut.	Other States.	England.	Ireland.	Scotland.	Canada.	Germany.	Italy.	France.	Sweden.	Russia.	Other For. Countries.	Total Native Decedents.	Total Foreign Decedents.	Nativity Unknown.	Total of all Nations.	Both Par. of U. S.	Each of Dif. Nat.	Both Par. English.	Irish.	Scotch.	Canadian.	German.	Italian.	French.	Swedish.	Russian.	Other For. Countries.	Parentage Unknown.	Total Births.
Morris	5	1	....	2	....	....	....	....	....	....	1	....	6	3	....	9	5	....	....	....	....	....	1	....	....	....	....	1	....	7
Naugatuck	74	8	3	20	....	....	7	1	....	4	4	1	82	40	....	122	88	59	3	32	....	....	11	22	....	21	62	73	1	372
New Britain	339	36	16	46	2	3	32	8	....	16	24	20	375	167	6	548	277	139	5	24	1	19	50	143	1	124	246	206	4	1239
New Canaan	18	17	....	1	....	....	5	2	....	....	....	....	35	8	....	43	34	7	1	2	....	....	2	11	....	....	1	2	1	61
New Fairfield	9	1	1	....	....	....	1	....	....	....	....	....	10	2	1	13	4	1	....	....	....	....	1	....	....	1	....	....	....	7
New Hartford	15	5	1	3	....	2	3	....	....	....	....	....	20	9	....	29	11	3	....	....	....	5	4	2	1	....	....	12	....	38
New Haven	1136	281	38	309	21	27	99	84	4	10	48	38	1417	678	26	2121	942	474	9	194	7	10	51	1188	....	65	395	191	7	3533
Newington	13	1	1	2	....	....	....	....	....	....	....	....	14	3	1	18	13	6	1	....	....	....	1	3	....	3	1	1	....	29
New London	172	53	7	43	5	5	4	6	1	2	3	6	225	82	11	318	226	65	4	45	1	3	4	81	....	2	47	36	2	516
New Milford	56	10	....	2	....	....	....	....	....	1	1	1	66	5	....	71	65	18	....	4	....	....	2	3	....	12	6	20	....	125
Newtown	24	8	....	9	....	....	2	....	1	....	1	....	32	13	2	47	28	4	....	4	....	....	....	2	....	1	4	....	1	44
Norfolk	11	8	1	3	....	....	....	1	....	....	....	....	19	5	....	24	16	7	....	2	....	....	....	4	....	....	....	1	....	30
North Branford	15	2	....	....	....	....	....	....	....	1	....	....	17	1	1	19	8	1	....	....	....	....	2	....	....	....	....	....	....	11
North Canaan	13	4	....	3	....	....	....	1	1	....	....	....	17	5	....	22	25	3	....	....	....	....	....	18	....	2	....	....	....	48
North Haven	24	2	....	2	....	....	2	2	....	....	....	....	26	6	....	32	19	5	....	....	....	....	....	26	....	....	1	5	....	56
North Stonington	20	2	....	....	....	....	....	....	....	....	....	....	22	....	3	25	16	....	....	....	....	....	....	....	....	....	....	....	....	16
Norwalk	177	85	9	38	3	3	16	7	2	3	1	17	262	99	5	366	224	66	1	10	1	....	9	50	....	2	7	63	....	433
Norwich	254	50	16	62	6	20	13	5	1	3	6	5	304	137	5	446	187	128	10	27	2	55	16	28	2	4	64	82	3	608
Old Lyme	10	1	....	5	....	....	....	....	....	....	....	....	11	5	....	16	15	5	....	1	....	....	....	....	....	....	....	....	1	22
Old Saybrook	12	2	....	2	....	....	....	....	....	....	....	1	14	3	....	17	14	4	....	....	....	....	....	9	....	....	....	1	....	28
Orange	65	26	....	10	....	....	5	2	....	2	....	2	91	21	1	113	102	26	2	6	....	....	3	8	....	3	4	10	4	168
Oxford	3	8	....	....	....	....	....	....	....	....	....	....	11	....	....	11	7	3	....	....	....	....	1	1	....	1	1	....	....	14
Plainfield	39	10	2	7	....	15	....	1	....	....	....	....	49	25	....	74	44	49	1	1	....	33	....	8	1	....	1	6	1	145
Plainville	19	4	1	4	....	1	....	2	....	....	....	....	23	8	....	31	21	8	4	....	....	1	....	12	....	2	1	....	1	50
Plymouth	31	4	1	5	....	1	....	....	....	1	3	....	35	11	1	47	31	17	1	1	....	....	4	3	....	4	69	27	1	158
Pomfret	7	6	....	2	....	....	....	....	....	....	....	....	13	2	....	15	30	8	....	2	....	....	....	1	....	2	....	....	1	44
Portland	33	3	2	7	....	2	....	....	....	5	....	....	36	16	....	52	25	18	....	....	....	2	....	1	....	11	13	9	....	79
Preston	23	6	2	2	1	1	2	1	....	1	1	....	29	11	5	45	7	1	1	....	....	....	1	....	....	....	1	1	....	12
Prospect	....	1	....	....	1	....	1	....	....	....	....	....	1	2	....	3	4	1	....	....	....	....	....	....	....	....	....	....	1	6
Putnam	51	22	....	5	1	21	....	....	....	....	1	....	73	28	4	105	70	53	....	1	....	27	....	2	....	....	1	2	1	157
Redding	11	5	1	1	....	....	....	....	....	....	1	....	16	3	....	19	13	3	....	....	....	....	....	2	....	3	....	1	....	22
Ridgefield	20	7	1	4	....	....	....	....	....	....	....	....	27	5	....	32	27	11	....	2	....	....	1	13	....	....	1	1	1	57
Rocky Hill	9	4	....	1	....	....	....	....	....	....	....	....	13	1	....	14	12	1	....	....	....	....	2	3	....	....	6	....	....	24
Roxbury	11	2	....	....	....	....	....	....	....	....	2	....	13	2	....	15	13	2	....	1	....	....	1	3	....	2	1	4	....	27
Salem	3	1	....	....	....	....	....	....	....	....	....	....	4	....	....	4	7	....	....	....	....	....	....	....	....	....	5	....	....	12

Salisbury	42	10	3	2	----	----	1	----	----	----	----	----	52	6	4	62	22	11	----	8	----	----	----	6	----	----	1	----	1	44
Saybrook	15	2	1	1	----	----	----	----	----	----	----	1	17	8	----	20	12	8	----	----	----	1	1	1	----	2	1	10	----	36
Scotland	6	2	----	----	----	----	----	----	----	----	----	----	8	----	----	8	7	4	----	----	----	----	1	----	----	----	----	----	----	12
Seymour	40	5	4	2	1	6	----	----	----	2	----	8	45	18	----	68	29	24	1	4	----	----	10	8	----	2	36	81	----	140
Sharon	14	11	----	----	----	----	----	----	2	----	----	----	25	2	----	27	28	1	----	----	----	----	1	1	----	----	2	1	1	35
Sherman	6	----	----	3	----	----	----	----	----	----	----	----	6	3	----	9	4	2	----	----	----	----	----	----	----	2	----	----	----	8
Simsbury	27	4	3	1	----	----	1	----	----	----	1	----	31	6	4	41	20	9	----	----	1	----	----	1	1	----	5	6	9	52
Somers	14	6	----	----	----	1	----	----	----	----	2	----	20	3	----	23	18	1	----	1	----	7	----	2	----	1	7	1	----	33
Southbury	7	4	1	2	----	----	----	----	----	1	2	----	11	6	1	18	15	8	----	----	----	----	----	----	----	2	----	----	----	20
Southington	49	6	2	7	----	----	4	3	----	----	----	1	55	17	----	72	40	16	1	7	----	1	2	68	----	1	7	20	2	160
South Windsor	12	2	----	3	----	----	----	----	----	----	4	----	14	7	1	22	22	7	----	3	----	----	1	1	----	----	5	3	1	48
Sprague	23	4	2	2	1	5	1	----	----	1	----	----	27	12	----	39	20	17	3	----	----	11	1	----	----	----	----	----	----	52
Stafford	37	17	4	2	2	3	1	2	----	----	----	3	54	17	2	73	47	23	----	1	----	8	4	38	----	----	8	5	----	184
Stamford	209	108	13	39	3	2	11	15	----	3	9	16	817	111	10	488	221	123	11	53	8	8	14	168	----	15	46	65	199	921
Sterling	11	3	----	1	----	----	----	----	----	----	----	----	19	1	----	20	23	9	2	----	----	----	----	3	----	----	----	8	----	40
Stonington	75	26	1	17	----	2	7	----	----	----	----	5	101	82	1	184	87	46	4	11	----	4	8	22	----	----	1	19	----	202
Stratford	56	9	6	2	----	4	5	----	----	2	----	2	65	21	----	86	40	20	3	15	----	----	2	6	----	2	2	5	----	95
Suffield	37	9	3	5	----	1	----	----	----	----	1	----	46	10	1	57	46	11	----	6	----	----	----	----	----	----	21	6	2	92
Thompson	30	16	1	1	----	16	----	----	----	5	----	2	46	25	----	71	38	24	----	3	1	54	----	4	----	5	5	7	1	137
Thomaston	28	3	----	10	----	----	----	----	----	----	----	----	31	10	----	41	36	16	3	5	----	1	2	----	----	3	4	28	----	98
Tolland	15	2	----	----	----	1	3	----	----	----	----	----	17	4	----	21	12	4	----	----	----	----	2	1	----	----	----	2	----	21
Torrington	128	16	3	15	----	1	5	3	6	----	4	6	189	43	----	182	128	65	3	21	1	5	28	88	18	4	33	51	----	445
Trumbull	20	3	1	----	----	----	----	----	----	----	----	----	23	1	----	24	17	4	----	1	----	----	----	----	----	----	----	----	----	22
Union	1	3	----	----	----	2	----	----	----	----	----	1	4	3	----	7	6	3	----	----	----	1	----	----	----	----	1	----	----	11
Vernon	60	15	2	14	1	----	23	----	----	----	1	1	75	42	1	118	74	44	5	6	----	1	23	5	----	----	16	23	----	197
Voluntown	6	1	----	1	----	2	----	----	----	----	----	----	7	3	1	11	9	2	----	----	----	2	----	----	----	----	----	----	----	18
Wallingford	98	15	6	18	----	3	4	4	----	----	2	4	108	36	1	145	68	65	2	7	----	8	17	39	1	3	21	66	1	298
Warren	7	----	----	----	----	----	----	----	----	----	----	----	7	----	1	8	8	----	----	----	----	----	----	----	----	----	----	----	----	8
Washington	18	6	----	6	----	----	1	----	----	2	----	----	24	9	----	33	8	6	----	----	----	----	----	----	----	8	3	8	2	30
Waterbury	682	106	21	158	10	30	21	36	1	3	18	10	788	318	5	1056	586	319	10	221	7	67	26	570	7	15	211	57	7	2108
Waterford	25	6	----	1	----	----	1	2	----	1	1	----	31	6	----	37	28	7	----	----	1	----	1	3	----	----	4	3	----	52
Watertown	34	5	4	3	----	5	----	----	----	----	----	----	39	12	----	51	45	20	----	6	----	2	----	----	----	3	1	2	----	79
Westbrook	21	----	----	----	----	----	----	----	----	----	----	----	21	----	----	21	8	3	----	----	----	----	----	3	----	----	----	----	----	14
West Hartford	28	10	1	18	2	2	2	----	----	1	----	2	38	28	----	66	31	15	----	1	1	3	3	7	----	6	----	6	----	78
Weston	9	3	----	----	----	----	1	----	----	1	----	----	12	2	----	14	7	1	----	----	----	----	----	----	----	2	----	----	----	10
Westport	43	23	----	7	1	1	7	3	1	----	----	7	66	27	----	98	80	10	----	1	1	----	1	10	----	----	----	6	----	59
Wethersfield	14	5	1	1	1	----	----	3	----	----	1	----	19	7	3	84	28	11	1	3	----	----	1	----	----	1	2	2	----	44
Willington	13	3	----	----	----	----	----	----	----	----	----	2	16	2	1	19	8	5	----	----	----	----	1	2	----	----	----	11	----	27
Wilton	10	7	2	----	----	----	2	----	----	----	----	1	17	5	1	28	28	4	----	----	----	----	----	1	----	1	----	3	----	32
Winchester	61	24	5	17	1	6	1	3	2	----	----	2	85	87	3	180	104	28	----	2	----	5	----	43	2	1	1	6	----	192
Windham	117	30	1	29	2	18	2	----	1	2	1	4	147	60	3	210	115	54	1	2	----	51	----	2	----	2	4	34	2	267
Windsor	38	11	3	4	----	1	1	1	----	----	1	----	49	11	----	60	52	12	----	----	----	5	----	1	1	2	11	12	----	96
Windsor Locks	26	3	1	3	1	1	----	----	----	----	----	----	29	11	----	40	26	10	----	3	----	2	----	44	----	----	2	12	----	104
Wolcott	11	1	----	1	----	----	----	----	1	----	----	----	12	2	----	14	13	----	----	----	----	1	----	----	----	----	----	----	2	16
Woodbridge	8	1	----	1	----	----	1	----	----	----	----	----	9	2	----	11	10	4	----	----	----	----	1	4	----	----	----	3	----	22
Woodbury	29	3	1	----	----	----	----	----	----	----	----	----	32	1	2	35	16	5	1	----	----	----	----	1	----	----	----	----	2	25
Woodstock	26	3	----	1	1	1	----	----	----	2	----	----	34	5	1	40	20	5	----	----	----	1	----	----	----	5	----	1	----	32
Total	9016	2347	398	1812	118	335	548	327	89	160	242	404	11363	4383	254	16000	8924	4124	194	1267	98	578	611	4421	51	678	2364	3058	336	26694

TABLE X.

RECAPITULATION OF TABLES EIGHT AND NINE—1908.

AGES.	1908, Total.	1907, Total.	1906, Total.	1905, Total.	1904, Total.	1903, Total.	1902, Total.	1901, Total.	1900, Total.	1899, Total.	Per Cent. to Total Mortality.									
											1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.
Deaths under 1 year	3,251	3,433	3,455	3,159	3,033	2,972	2,864	2,805	3,521	2,828	20.3	19.6	20.6	18.7	19.3	19.1	19.9	18.8	21.5	19.6
from 1 to 5	1,038	1,192	1,243	1,076	1,000	1,275	1,139	1,063	1,294	970	6.5	6.8	7.4	6.6	6.3	8.2	7.9	7.1	7.8	6.7
Total, First Period, Infantile	4,289	4,625	4,698	4,235	4,033	4,247	4,003	3,868	4,815	3,798	26.8	24.6	28.0	25.9	25.6	27.4	27.7	26.0	29.4	26.3
Deaths from 5 to 10	297	330	388	414	370	397	367	383	393	305	1.9	1.0	2.3	2.5	2.3	2.5	2.5	2.5	2.4	2.1
10 to 20	546	596	566	633	646	583	504	564	696	521	3.4	3.4	3.3	3.8	4.1	3.7	3.5	3.7	4.2	3.6
Total, Second Period, Youth	843	926	954	1,047	1,016	980	871	947	1,089	826	5.3	5.2	5.6	6.4	6.4	6.3	6.0	6.3	6.6	5.7
Deaths from 20 to 30	1,090	1,158	1,149	1,190	1,100	1,093	1,032	1,135	1,172	1,100	6.8	6.6	6.8	7.3	7.0	7.0	7.1	7.6	7.1	7.6
30 to 40	1,227	1,436	1,393	1,298	1,291	1,220	1,158	1,176	1,247	1,207	7.7	8.2	8.3	7.9	8.2	7.8	8.0	7.9	7.6	8.3
40 to 50	1,366	1,561	1,368	1,408	1,319	1,225	1,151	1,221	1,214	1,085	8.5	8.9	8.1	8.6	8.3	7.9	8.0	8.2	7.4	7.5
50 to 60	1,605	1,726	1,571	1,558	1,488	1,475	1,456	1,455	1,497	1,353	10.0	9.8	9.3	9.5	9.4	9.5	10.1	9.7	9.1	9,4
Total, Third Period, Prod. Age	5,288	5,881	5,481	5,454	5,198	5,013	4,797	4,987	5,130	4,745	33.1	33.6	32.6	33.4	33.0	32.3	33.3	33.5	31.2	32.8
Deaths from 60 to 70	2,045	2,211	2,023	1,984	2,057	1,894	1,728	1,775	1,805	1,641	12.8	12.6	12.0	12.1	13.0	12.2	12.0	11.9	11.2	11.4
70 to 80	2,096	2,242	2,096	2,083	1,949	1,999	1,706	1,863	1,954	1,892	13.1	12.8	12.5	12.7	12.4	12.9	11.8	12.5	11.9	13.1
80 to 90	1,199	1,321	1,241	1,212	1,167	1,123	1,030	1,148	1,267	1,126	7.5	7.5	7.4	7.4	7.4	7.2	7.1	7.7	7.7	7.8
90 to 100	191	221	217	200	221	173	177	196	208	224	1.2	1.2	1.2	1.2	1.4	1.1	1.2	1.3	1.2	1.5
100 and over	6	10	10	5	4	4	7	6	5	15	.0	....	.0	.0	.0	.0	.0	.0	.0	.1
Total, Fourth Period, Old Age	5,537	6,005	5,587	5,484	5,398	5,193	4,648	4,988	5,239	4,898	34.6	34.3	33.3	33.0	34.3	33.5	32.3	33.5	32.0	33.8
Age not stated	43	53	46	78	66	57	67	66	95	119	.2	.3	.2	.4	.4	.3	.4	.4	.0	.1
Grand Total	16,000	17,490	16,766	16,298	15,711	15,490	14,386	14,856	16,368	14,381	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NATIONALITY.																				
Deaths of those born in Conn.	9,016	9,777	9,668	9,128	9,084	9,017	8,430	8,564	9,788	8,462	56.4	55.9	57.6	56.0	57.8	58.2	58.5	57.6	59.7	58.8
other states	2,347	2,511	2,298	2,446	2,157	2,076	1,951	2,037	2,189	1,926	14.6	14.3	13.7	15.0	13.7	13.4	13.5	13.7	13.3	13.3
Total for the United States...	11,363	12,288	11,966	11,574	11,241	11,093	10,381	10,601	11,977	10,388	71.0	70.2	71.3	71.0	71.5	71.6	72.1	71.3	73.1	72.1
Deaths of those born in England.	398	453	397	450	390	368	333	361	431	362	2.5	2.5	2.4	2.7	2.4	2.8	2.3	2.4	2.6	2.5
Ireland..	1,812	2,059	1,880	1,977	1,926	1,930	1,856	1,947	1,986	1,920	11.3	11.7	11.2	12.1	12.2	12.4	12.8	13.1	12.1	13.3
Canada..	335	358	342	363	311	328	280	308	329	256	2.1	2.0	2.0	2.2	1.9	2.1	1.9	2.0	2.1	1.7
Germany	548	546	578	509	532	525	466	517	522	483	3.4	3.1	3.4	3.1	3.8	3.3	3.2	3.4	3.1	3.3
Italy	327	464	383	280	256	226	182	149	189	126	2.0	2.6	2.3	1.7	1.6	1.4	1.2	1.0	1.1	.1
Sweden .	160	203	168	161	178	149	140	149	129	120	1.0	1.1	1.0	.9	1.1	.9	.9	1.0	.7	.1
Other Foreign Countries..........	808	799	784	683	576	576	497	502	478	411	5.0	4.5	4.6	4.1	3.6	3.7	3.4	3.3	2.8	2.8
Total Foreign Deaths	4,388	4,882	4,532	4,423	4,179	4,102	3,754	3,933	4,064	3,678	27.4	27.9	27.0	27.1	26.5	26.4	26.0	26.4	24.8	23.8
Nativity not stated...............	251	320	268	301	291	295	251	322	327	315	1.6	1.5	1.5	1.8	1.9	1.9	1.7	2.1	1.9	2.1
Grand Total	16,000	17,490	16,766	16,298	15,711	15,490	14,386	14,856	16,368	14,381	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEASONS.*																				
Deaths in Spring	3,992	4,794	4,326	4,208	4,221	3,953	3,550	3,777	4,617	3,437	25.0	27.4	25.8	25.8	26.9	25.5	24.6	25.4	27.5	23.8
Summer	4,054	3,976	4,440	4,361	3,901	3,990	3,825	3,659	4,369	3,816	25.3	22.7	26.4	26.7	24.1	25.7	26.5	24.6	26.6	26.5
Autumn	3,601	4,689	3,929	3,627	3,492	3,464	3,396	3,426	3,605	3,178	22.5	26.8	23.3	22.2	22 2	22.3	23.6	23.0	22.0	22.1
Winter	4,353	4,031	4,071	4,102	4,097	4,083	3,615	3,994	3,777	3,950	27.2	23.0	24.2	25.1	26.0	26.3	25.1	26.8	23.0	27.4
Total.........................	16,000	17,490	16,766	16,298	15,711	15,490	14,386	14,856	16,368	14,381	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BIRTHS.																				
Births in Spring	6,819	6,371	6,080	5,878	5,658	5,437	5,173	5,052	5,061	4,973	25.5	24.5	24.6	25.2	24.7	24.9	24.3	24.8	24.6	23.8
Summer	6,838	6,202	6,491	6,066	5,960	5,484	5,526	5,213	5,433	5,418	25.6	23.9	26.3	26.0	26.0	25.2	26.0	25.6	26.4	25.9
Autumn	6,338	6,870	6,117	5,715	5,612	4,594	5,344	5,119	5,191	5,292	23.7	26.4	24.8	24.5	24.5	25.7	25.1	25.2	25.2	25.4
Winter	6,699	6,502	5,953	5,612	5,634	5,236	5,173	4,910	4,875	5,172	25.1	25.0	24.1	24.1	24.6	24.0	24.3	24.1	23.7	24.7
Total.........................	26,694	25,945	24,641	23,271	22,864	21,751	21,216	20,294	20,560	20,855	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* A few not stated by seasons are distributed equally.

TABLE XI.

CAUSES OF DEATH BY MONTHS, AGE AND SEX, NOSOLOGICALLY ARRANGED BY CLASSES—1908.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Month not stated.	CAUSES.	Under 1.	1 to 2.	2 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	100 and over.	Age not stated.	Male.	Female.	Sex not stated.	Total.
													Nomenclature of Statistics of Death.																			
													CLASS I.—GENERAL DISEASES.																			
17	13	12	6	12	5	21	32	21	23	13	19	..	Typhoid Fever	2	...	6	8	32	62	37	24	12	9	2	...	...	..	..	126	68	..	194
...	...	1	...	...	...	1	...	...	2	...	...	..	Fever, Intermittent	...	...	...	1	...	1	...	...	1	...	1	...	...	..	..	2	2	..	4
1	1	1	3	3	1	3	5	4	1	2	...	..	a. Malarial	2	3	3	2	1	1	1	...	4	1	4	3	...	..	..	13	12	..	25
...	2	...	...	...	1	1	...	1	...	...	2	..	b. Remittent Fever	1	...	1	...	1	1	1	...	...	...	...	2	...	..	..	2	5	..	7
3	13	13	15	10	7	7	4	2	3	5	6	..	Measles	26	36	15	6	...	1	...	1	1	...	2	...	...	..	..	46	42	..	88
6	8	6	8	12	5	3	1	4	2	2	3	..	Scarlatina	4	6	20	16	8	5	1	...	...	...	...	...	...	..	..	32	28	..	60
4	7	6	7	13	5	14	14	9	1	7	8	..	Whooping Cough	50	26	16	2	...	...	...	...	...	1	...	...	...	..	..	39	56	..	95
15	17	12	17	9	6	7	9	16	25	36	25	..	Diphtheria—Membranous Croup	16	34	80	50	7	3	3	1	...	...	...	...	...	..	..	100	94	..	194
143	102	66	28	4	8	1	3	4	6	13	18	..	Grippe—Influenza	22	4	4	3	8	5	18	20	51	80	102	70	8	..	1	177	219	..	396
...	...	...	...	...	...	5	4	1	...	...	...	..	Cholera, Nostras	2	1	...	2	...	...	1	...	2	...	...	2	...	..	..	3	7	..	10
...	2	...	3	1	6	29	25	10	7	...	...	..	Dysentery	12	5	2	...	...	3	3	4	3	11	27	12	1	..	..	33	50	..	83
5	7	10	3	2	2	2	...	1	2	2	6	..	Erysipelas	12	1	1	1	1	2	2	4	7	4	5	1	...	..	1	21	21	..	42
...	...	1	...	3	...	...	...	...	1	...	...	..	Other Epidem. Affections	3	1	1	...	...	...	...	...	...	...	...	...	...	..	..	...	5	..	5
3	3	2	3	3	6	1	3	1	1	3	...	..	Purulent Infection and Septicæmia	4	...	2	...	1	1	4	3	6	3	2	3	...	..	..	21	8	..	29
1	2	3	...	2	1	2	2	...	...	1	...	..	a. Pyæmia	...	1	1	...	1	3	2	4	2	...	...	...	...	..	..	10	4	..	14
...	...	...	...	1	...	...	...	...	...	...	...	..	Rabies	...	...	...	...	...	1	...	...	...	...	...	...	...	..	..	1	...	..	1
3	...	...	2	...	1	...	...	1	1	1	1	..	Tubercle of Larynx	...	1	...	...	...	1	2	5	...	...	1	...	...	..	..	8	2	..	10
133	117	126	158	109	115	104	106	91	125	101	106	..	Tubercle of Lungs	19	11	10	10	140	385	349	225	126	72	35	6	2	..	1	802	589	..	1391

4	10	11	5	8	12	8	7	6	2	7	9	--	Tubercle of Meninges	28	15	12	10	8	6	6	1	1	2	---	---	---	--	--	52	37	--	89
4	2	3	5	5	---	6	4	11	5	1	5	--	Tubercle, Abdominal	10	3	1	1	3	5	10	7	3	6	1	---	---	--	1	30	21	--	51
1	1	---	---	---	1	1	---	1	---	1	1	--	Pott's Disease, Psoas Abscess	---	---	1	---	1	1	---	1	---	3	---	---	---	--	--	5	2	--	7
---	---	1	1	---	---	---	---	---	---	---	1	--	Abscess, Cold and by Congestion	---	---	---	---	---	2	---	1	---	---	---	---	---	--	--	3	---	--	3
---	---	1	---	1	---	---	2	1	---	1	---	--	White Tumors (White Swellings)	---	---	---	---	1	---	2	1	---	2	---	---	---	--	--	5	1	--	6
2	2	1	1	---	---	---	2	1	1	---	2	--	Tubercle of Other Organs	---	---	---	---	---	4	3	2	1	2	---	---	---	--	--	10	2	--	12
1	1	1	2	2	5	7	5	3	4	5	4	--	Generalized Tubercle	1	1	2	1	2	12	9	8	1	2	1	---	---	--	--	24	16	--	40
---	---	---	---	---	1	---	---	---	---	1	---	--	Scrofula	1	1	---	---	---	---	---	---	---	---	---	---	---	--	--	---	2	--	2
---	3	2	2	3	2	4	6	2	1	1	1	--	Syphilis	17	---	---	---	---	---	1	3	5	1	---	---	---	--	--	15	12	--	27
---	1	---	---	---	---	---	---	---	---	---	---	--	Gonorrhœal Infections of Children	1	---	---	---	---	---	---	---	---	---	---	---	---	--	--	1	---	--	1
---	---	---	---	1	---	---	---	---	---	---	---	--	Cancer and other Malig. Tumors of Buc. Cavity —	---	---	---	---	---	---	---	---	---	1	---	---	---	--	--	1	---	--	1
---	---	2	1	---	---	1	---	---	2	---	1	--	of Lips	---	---	---	---	---	1	---	---	1	---	3	2	---	--	--	7	---	--	7
1	1	1	2	---	2	1	---	---	3	1	---	--	of Maxilla	---	---	---	---	---	---	---	2	4	4	1	1	---	--	--	7	5	--	12
---	1	---	1	---	1	---	2	---	---	1	2	--	of Tongue	---	---	---	---	---	---	---	2	4	1	1	---	---	--	--	8	---	--	8
---	1	---	---	---	---	---	---	1	---	---	1	--	Cancer and other Malig. Tumors of Stomach and Liver—	---	---	---	---	---	---	---	---	2	1	---	---	---	--	--	2	1	--	3
2	---	---	---	---	1	---	---	2	1	1	---	--	of Gall Bladder	---	---	---	---	---	---	---	---	3	3	1	---	---	--	--	3	4	--	7
8	5	9	6	5	6	2	8	4	7	5	5	--	of Liver	---	---	---	---	---	2	3	11	19	20	12	3	---	--	--	32	38	--	70
---	---	---	1	---	1	---	---	---	---	---	---	--	Œsophagus	---	---	---	---	---	---	---	---	---	2	---	---	---	--	--	2	---	--	2
4	---	---	1	---	---	---	1	---	1	1	---	--	of Pancreas	---	---	---	---	---	---	1	1	1	2	3	---	---	--	--	3	5	--	8
---	1	---	---	---	---	---	1	---	---	1	---	--	of Pylorus	---	---	---	---	---	---	1	---	---	1	1	---	---	--	--	2	1	--	3
20	12	19	14	11	13	13	18	13	14	11	17	--	of Stomach	---	---	---	---	1	2	8	23	43	55	31	11	1	--	--	96	79	--	175
---	1	1	---	1	2	---	---	---	---	---	---	--	Cancer and other Malig. Tumors of Peritoneum, Intes. and Rect.—	---	---	---	---	---	---	1	---	1	1	2	---	---	--	--	1	4	--	5
---	---	3	1	1	1	1	1	---	---	---	---	--	of Colon	---	---	---	---	---	---	---	1	4	2	1	---	---	--	--	1	7	--	8
5	2	3	9	4	6	3	7	1	4	6	4	--	of Intestines	---	---	---	---	---	1	5	8	16	16	7	1	---	--	--	20	34	--	54
1	4	2	4	2	2	1	5	4	2	3	2	--	of Rectum	---	---	---	---	---	---	1	4	10	11	5	1	---	--	--	10	22	--	32
---	---	1	---	---	---	1	---	---	2	---	---	--	of Sigmoid Flexure	---	---	---	---	---	---	---	2	1	---	1	---	---	--	--	1	3	--	4
---	---	---	---	---	---	---	1	---	---	---	---	--	of Spleen	---	---	---	---	---	---	---	1	---	---	---	---	---	--	--	---	1	--	1
---	---	---	---	2	1	---	---	---	1	---	---	--	of Peritoneum	---	---	---	---	---	---	1	1	---	2	---	---	---	--	--	---	4	--	4
													Cancer and other Malig. Tumors of the Female Genitals—																			
---	1	---	1	---	2	1	---	1	---	---	---	--	of Cervix	---	---	---	---	---	2	---	2	2	---	---	---	---	--	--	---	6	--	6
1	2	2	---	---	---	1	---	1	---	---	1	--	of Ovary	---	---	---	---	---	---	2	---	3	2	---	1	---	--	--	---	8	--	8

TABLE XI—CONTINUED—1908.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Month not stated.	CAUSES.	Under 1.	1 to 2.	2 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	100 and over.	Age not stated.	Male.	Female.	Sex not stated.	Total.
10	7	12	8	7	12	15	15	4	9	11	8	...	Cancer of Uterus	...	...	...	...	...	4	7	22	35	29	19	2	...	...	...	...	118	...	118
...	...	...	...	...	...	...	...	...	1	...	...	...	of Vagina	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	1
...	...	...	...	...	...	...	...	1	...	...	...	...	of Vulva	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	1
7	8	6	7	6	7	8	8	9	6	7	9	...	Cancer and other Malig. Tumors of the Breast	...	...	...	...	...	...	5	17	20	27	10	7	1	...	1	...	88	...	88
1	3	1	1	1	...	1	...	...	1	...	3	...	Cancer and other Malig. Tumors of the Skin	...	...	1	...	...	...	1	...	4	3	1	2	...	...	...	8	4	...	12
1	1	2	2	1	...	2	4	2	1	...	2	...	of Face	...	...	...	...	...	1	1	1	2	5	4	4	...	...	...	14	4	...	18
9	13	8	9	9	6	10	12	2	8	12	10	...	Cancer and other Malig. Tumors of other Organs and Organs not specified	...	...	4	1	3	4	3	20	24	25	16	7	1	...	...	57	51	...	108
...	...	...	...	1	...	1	...	2	...	...	...	...	of Abdomen	...	...	...	...	...	...	...	...	3	...	...	...	...	...	1	1	3	...	4
1	...	1	1	...	1	1	4	1	...	...	1	...	of Bladder	...	...	...	...	...	...	2	...	1	4	1	3	...	...	...	8	3	...	11
...	...	1	1	1	...	...	...	...	...	...	...	...	of Lungs	...	...	...	...	...	1	...	...	...	1	...	1	...	...	...	2	1	...	3
...	1	...	...	2	...	...	1	2	...	...	...	...	of Pelvis	...	...	...	...	...	...	...	1	...	3	2	...	...	...	...	3	3	...	6
...	...	...	...	...	...	...	...	...	1	...	...	...	of Penis	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	1
...	...	...	...	1	...	1	...	...	...	...	...	...	of Testicle	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	2	...	...	2
1	2	...	...	...	...	1	...	...	...	1	...	...	Other Tumors (Tum. of the Female Genitals excepted)	...	...	...	1	...	...	1	...	1	...	2	...	...	...	...	3	2	...	5
1	...	3	...	2	1	...	1	...	...	...	2	...	a. Abdominal	...	...	...	...	...	...	...	2	1	2	3	2	...	...	...	2	8	...	10
...	...	...	...	...	...	1	...	...	...	...	...	...	b. Intestinal	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	1
10	8	7	12	8	7	10	4	6	4	5	3	...	Rheumatism, Acute, Articular	3	...	2	10	11	5	8	8	18	7	7	4	1	...	1	36	49	...	85
3	3	6	3	3	6	...	...	...	4	1	2	...	Rheumatism, Chronic, and Gout	...	...	...	...	2	1	3	4	4	4	4	8	1	...	...	13	18	...	31
...	...	...	...	...	...	...	...	...	1	...	...	...	Scorbutus	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1

23	15	15	12	11	7	12	17	13	10	18	13	--	Diabetes	---	---	2	---	12	8	10	20	30	53	31	9	---	--	1	72	104	--	176
---	---	---	---	---	3	---	2	1	---	---	1	--	Goiter, Exophthalmic	---	---	---	---	---	---	2	3	1	1	---	---	---	--	--	---	7	--	7
---	---	---	1	1	---	---	1	---	1	1	---	--	Addison's Disease	---	---	---	---	---	---	2	2	1	---	---	---	---	--	--	4	1	--	5
1	1	---	---	---	---	1	---	---	---	---	---	--	Leukæmia	1	---	1	---	---	---	1	---	---	---	---	---	---	--	--	2	1	--	3
---	1	---	---	---	1	---	---	1	---	1	---	--	Hodgkin's Disease	---	---	---	1	---	1	---	1	---	1	---	---	---	--	--	4	---	--	4
1	---	---	---	3	---	1	2	---	---	1	1	--	Anæmia, Chlorosis	1	1	---	---	1	3	---	---	---	1	---	2	---	--	--	4	5	--	9
2	3	2	7	3	3	3	3	---	5	2	1	--	Anæmia, Pernicious	---	---	---	---	---	4	4	7	7	4	7	1	---	--	--	10	24	--	34
1	---	---	---	1	---	---	---	1	1	---	---	--	Other General Diseases	2	---	---	---	---	---	---	1	1	---	---	---	---	--	--	2	2	--	4
5	4	5	4	2	3	8	4	6	7	2	10	--	Alcoholism, Acute and Chronic	---	---	---	---	---	4	15	24	9	5	3	---	---	--	--	49	11	--	60
1	---	---	---	2	2	2	1	---	1	---	1	--	a. Delirium Tremens	---	---	---	---	---	1	2	5	1	---	1	---	---	--	--	10	---	--	10
---	1	1	---	---	---	1	---	---	---	---	---	--	Saturnism	---	---	---	---	---	---	---	2	1	---	---	---	---	--	--	1	2	--	3
3	---	---	1	1	1	1	---	---	---	---	1	--	Other Chronic Poisonings	--	---	---	---	---	---	2	2	1	1	2	---	---	--	--	4	4	--	8
													Class II.—Diseases of the Nervous System and Organs of Special Sense.																			
---	---	---	---	---	---	---	---	---	1	---	---	--	Encephalitis	---	---	---	---	---	---	---	1	---	---	---	---	---	--	--	---	1	--	1
16	20	20	8	16	20	21	14	13	4	7	15	--	Meningitis, Simple	58	35	23	15	13	3	7	8	2	4	4	2	---	--	--	94	80	--	174
---	---	---	---	1	---	---	---	---	---	---	---	--	a. Meningitis, Epidem. Cerebrospinal	---	---	---	---	---	1	---	---	---	---	---	---	---	--	--	1	---	--	1
3	7	5	8	6	7	6	3	3	3	3	2	--	b. Meningitis, Cerebro-spinal	10	9	9	6	10	5	1	3	1	2	---	---	---	--	--	23	33	--	56
---	---	1	1	---	---	1	---	---	---	---	---	--	c. Meningitis, Lepto	---	---	1	1	---	---	---	---	1	---	---	---	---	--	--	1	2	--	3
1	3	4	3	4	---	2	4	---	1	2	4	--	d. Meningitis, Spinal	16	2	3	1	---	2	1	2	1	---	---	---	---	--	--	14	14	--	28
1	2	4	1	2	2	5	1	2	2	5	---	--	Locomotor Ataxia, Progressive	---	---	---	---	---	1	1	5	11	4	3	2	---	--	--	23	4	--	27
3	5	3	1	1	2	2	---	1	5	2	4	--	Other Diseases of the Spinal Cord	---	1	2	---	2	2	6	1	5	4	4	1	1	--	--	13	16	--	29
1	1	1	---	---	1	1	1	1	2	1	2	--	a. Lateral Sclerosis	---	---	---	---	---	---	---	3	---	3	5	1	---	--	--	7	5	--	12
---	---	1	---	---	---	---	---	---	---	---	---	--	b. Muscular Atrophy	---	---	---	---	---	---	---	1	---	---	---	---	---	--	--	---	1	--	1
4	3	2	2	---	1	---	---	1	---	2	---	--	c. Paralysis Agitans	---	---	---	---	---	---	---	---	1	4	7	3	---	--	--	10	5	--	15
84	94	84	79	76	66	68	68	72	76	79	77	--	Cerebral Congestion—Hemorrhage	10	1	---	1	3	9	19	70	122	257	375	140	16	--	--	431	492		923
2	2	4	3	2	4	1	3	5	3	1	2	--	Cerebral Softening	---	---	---	---	---	---	2	---	2	6	11	10	1	--	--	15	17	--	32
6	8	4	9	7	6	5	4	11	11	5	5	--	Paralysis without Specified Cause	---	1	1	---	---	---	---	4	7	17	27	23	1	--	--	43	38	--	81
1	3	3	2	3	6	5	2	1	2	1	2	--	a. Hemiplegia	---	---	1	1	---	---	---	2	3	5	11	7	1	--	--	18	13	--	31
---	---	---	---	---	1	--	---	1	---	1	---	--	b. Paraplegia	---	---	---	---	---	---	---	1	---	---	---	1	1	--	--	---	3	--	3

TABLE XI—CONTINUED—1908.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Month not stated.	CAUSES.	Under 1.	1 to 2.	2 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	100 and over.	Age not stated.	Male.	Female.	Sex not stated.	Total.
6	2	4	3	7	7	5	3	5	6	6	4	--	Paralysis General	---	---	---	---	---	1	7	23	12	6	4	3	2	--	--	40	18	--	58
4	4	4	4	5	---	7	3	1	2	2	---	--	Other Forms of Mental Alienation	---	---	---	---	---	6	3	1	11	9	5	1	---	--	--	10	26	--	36
5	4	6	9	4	5	6	1	8	4	2	5	--	Epilepsy	3	---	2	1	6	7	12	14	6	5	3	---	---	--	--	25	34	--	59
2	---	1	1	1	---	1	---	---	1	1	---	--	Eclampsia (non-puerp.) 5 yrs. over	---	---	---	1	2	1	3	---	---	1	---	---	---	--	--	1	7	--	8
10	12	15	8	6	6	11	13	15	7	17	9	--	Convulsions of Children (under 5)	110	10	9	---	---	---	---	---	---	---	---	---	---	--	--	71	58	--	129
---	---	---	1	1	1	1	3	2	---	---	1	--	Tetanus	---	---	1	4	2	1	1	---	1	---	---	---	---	--	--	8	2	--	10
---	1	---	2	1	---	2	---	1	1	---	1	--	a. Trismus Nascentium	9	---	---	---	---	---	---	---	---	---	---	---	---	--	--	7	2	--	9
1	---	1	---	1	---	---	---	1	---	1	---	--	Chorea	---	---	---	---	3	---	---	2	---	---	---	---	---	--	--	---	5	--	5
2	3	1	1	2	2	---	3	1	2	---	3	--	Other Dis. of the Nervous System	2	1	2	---	2	---	1	5	2	1	2	2	---	--	--	7	13	--	20
---	---	---	---	---	1	---	---	---	---	---	---	--	a. Organic Brain Disease	---	---	---	---	---	---	---	---	1	---	---	---	---	--	--	1	---	--	1
---	---	---	1	---	---	---	---	---	---	---	---	--	b. Cerebral Anæmia	---	---	---	---	---	---	---	---	---	---	1	---	---	--	--	---	1	--	1
1	2	1	6	1	3	2	3	2	2	3	---	--	c. Cerebral Tumor	3	---	2	---	2	5	2	5	1	4	2	---	---	--	--	16	10	--	26
---	---	---	---	---	---	---	---	---	---	---	1	--	d. Labio-glosso-laryngeal Paralysis	---	---	---	---	---	---	---	---	---	---	---	---	1	--	--	1	---	--	1
---	---	---	---	1	---	---	---	---	---	---	---	--	e. Neuralgia	---	---	---	---	---	---	---	---	---	1	---	---	---	--	--	---	1	--	1
---	1	---	---	---	2	---	---	1	---	1	---	--	f. Neurasthenia	---	---	---	---	---	---	---	1	2	1	1	---	---	--	--	1	4	--	5
---	---	---	---	---	---	---	---	---	---	---	1	--	g. Multiple Neuritis	---	---	---	---	---	---	---	1	---	---	---	---	---	--	--	---	1	--	1
---	---	---	---	1	---	---	---	---	---	---	---	--	Diseases of the Eye and its Adnexa	1	---	---	---	---	---	---	---	---	---	---	---	---	--	--	1	---	--	1
4	5	1	1	3	1	---	1	1	---	---	2	--	Diseases of the Ear—Otitis	5	1	2	---	---	2	2	2	---	3	2	---	---	--	--	12	7	--	19
													CLASS III.—DISEASES OF THE CIRCULATORY APPARATUS.																			
---	3	---	---	2	1	2	2	1	1	---	2	--	Pericarditis	---	---	1	---	---	1	1	1	1	7	---	2	---	--	--	6	8	--	14

16	12	14	16	15	12	11	8	5	9	14	9	--	Endocarditis, Acute	3	1	2	8	6	11	20	16	23	23	16	6	---	--	1	68	73	--	136
10	4	6	7	8	7	10	5	10	8	6	2	--	a. Myocarditis	---	---	---	---	---	2	4	4	17	22	21	9	3	--	1	43	40	--	83
85	73	96	80	74	56	66	60	65	79	77	85	--	Organic Diseases of the Heart	8	---	1	8	19	21	52	74	132	198	252	121	4	2	4	442	454	--	896
1	---	---	1	---	---	---	---	---	---	---	---	--	a. Cardiac Asthma	---	---	---	---	---	---	---	---	1	1	---	---	---	--	--	1	1	--	2
7	8	9	6	4	5	1	3	3	2	3	7	--	b. Fatty Degeneration	---	---	---	---	---	---	3	7	6	19	18	4	---	--	--	24	33	--	57
25	44	31	32	31	25	20	36	24	33	25	45	--	c. Valvular	5	---	---	1	7	11	17	34	69	82	98	42	5	--	--	203	168	--	371
4	10	8	8	9	12	5	7	4	7	6	6	--	Angina Pectoris	---	---	---	---	2	2	4	7	11	31	18	9	2	--	--	54	32	--	86
4	---	3	---	---	1	---	2	2	3	3	3	--	Affections of Arteries (Atheroma, Aneurism, etc.)	---	---	---	---	---	---	1	2	4	5	7	2	---	--	--	8	13	--	21
1	---	---	---	---	1	---	---	---	---	---	1	--	a. Aneurism of the Aorta	---	---	---	---	---	1	---	---	---	---	1	---	---	--	1	2	1	--	3
17	25	26	28	17	15	22	14	22	20	7	20	--	b. Arterio-Sclerosis	---	---	---	---	---	---	1	2	22	45	91	65	7	--	--	142	91	--	233
2	---	---	2	---	---	---	2	2	2	---	2	--	c. Atheroma of Coronary Arteries	---	---	---	---	---	---	---	---	2	2	4	3	1	--	--	7	5	--	12
1	4	9	12	8	6	4	5	2	5	4	7	--	Embolus and Thrombosis (non-puerperal)	1	---	---	---	4	3	6	4	9	13	12	12	2	--	1	29	38	--	67
---	2	---	---	1	---	---	---	1	---	---	1	--	Affect. of Veins (Varices, Hemorrhoids, Phlebitis)	---	---	---	---	---	---	1	2	1	---	1	---	---	--	--	---	5	--	5
---	---	---	---	---	---	---	---	---	---	1	2	--	Affect. of the Lymphatic System (Lymphangitis, etc.)	1	---	---	---	---	---	---	---	---	1	---	1	---	--	--	1	2	--	3
---	---	1	---	---	---	1	---	---	---	---	---	--	Hemorrhages	---	---	---	---	---	---	---	1	---	1	---	---	---	--	--	---	2	--	2
---	1	1	---	---	---	---	---	---	1	2	1	--	a. Purpura Hemorrhagica	2	1	---	---	1	2	---	---	---	---	---	---	---	--	--	4	2	--	6
													CLASS IV.—DISEASES OF THE RESPIRATORY SYSTEM.																			
1	1	---	---	---	1	---	---	1	---	---	---	--	Affections of the Larynx	1	---	---	---	---	---	2	1	---	---	---	---	---	--	--	3	1	--	4
---	1	---	---	1	---	---	---	---	3	3	2	--	a. Laryngitis	1	---	5	1	---	---	2	---	---	1	---	---	---	--	--	8	2	--	10
---	---	---	---	---	---	---	---	---	1	---	---	--	b. Laryngismus Stridulus	---	1	---	---	---	---	---	---	---	---	---	---	---	--	--	1	---	--	1
---	---	---	---	1	---	---	---	---	1	---	---	--	Affections of the Thyroid Body	1	---	---	---	---	---	1	---	---	---	---	---	---	--	--	---	2	--	2
23	21	21	22	16	6	5	3	7	9	10	11	--	Bronchitis, Acute	88	19	8	---	---	2	---	1	2	9	14	11	---	--	--	83	71	--	154
4	7	10	3	5	2	---	2	3	4	3	5	--	a. Capillary	21	9	7	---	---	---	---	---	1	6	1	3	---	--	--	26	22	--	48
22	19	13	12	10	10	4	3	12	7	9	19	--	Bronchitis, Chronic	3	1	---	1	2	3	4	7	14	28	37	28	12	--	--	66	74	--	140
40	38	50	33	25	13	15	13	14	14	17	37	--	Broncho-Pneumonia	115	54	22	9	---	1	7	11	16	22	26	23	3	--	--	161	148	--	309
187	141	128	106	79	30	34	18	35	60	72	129	--	Pneumonia	170	65	43	26	25	40	87	92	108	157	129	65	10	--	2	524	495	--	1019
8	2	8	4	5	1	2	1	2	1	6	2	--	a. Pleuro-Pneumonia	2	2	---	1	2	6	7	5	7	3	6	1	---	--	--	17	25	--	42

TABLE XI—CONTINUED—1908.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Month not stated.	CAUSES.	Under 1.	1 to 2.	2 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	100 and over.	Age not stated.	Male.	Female.	Sex not stated.	Total.
2	3	3	3	1	5	2	1	3	3	3	4	--	Pleurisy	1	3	1	---	1	2	3	5	5	5	5	2	---	--	--	16	17	--	33
2	8	9	4	4	3	2	2	3	5	3	3	--	Pulmonary Congest. and Apoplexy	11	---	2	---	---	2	2	2	2	7	9	10	1	--	--	18	30	--	48
1	---	---	---	---	---	---	---	---	---	---	---	--	Gangrene of the Lung	---	---	---	---	---	---	---	---	---	1	---	---	---	--	--	1	---	--	1
2	2	3	2	5	---	---	---	---	1	3	---	--	Asthma	---	---	---	---	---	---	1	1	•7	3	4	2	---	--	--	8	10	--	18
1	2	---	---	---	2	---	---	---	1	1	---	--	Pulmonary Emphysema	---	---	---	---	1	---	1	1	1	1	1	1	---	--	--	4	3	--	7
---	---	---	1	1	---	---	---	1	1	1	---	--	Other Dis. of Respiratory Apparatus (Phthisis excepted)	1	2	---	---	---	---	---	1	---	1	---	---	---	--	--	2	3	--	5
1	1	---	1	1	---	2	1	---	---	2	---	--	a. Abscess of the Lung	---	---	2	---	---	2	1	2	1	1	---	---	---	--	--	5	4	--	9
---	---	---	---	---	1	1	1	3	2	---	---	--	b. Pulmonary Hemorrhage	2	---	---	---	---	1	1	1	---	3	---	---	---	--	--	4	4	--	8
													CLASS V.—DISEASES OF THE DIGESTIVE APPARATUS.																			
---	2	---	---	---	---	1	---	1	---	2	2	--	Affec'ns of Mouth and its Adnexa	5	---	---	---	---	1	---	---	---	1	1	---	---	--	--	2	6	--	8
---	---	3	1	---	1	---	---	---	---	1	1	--	Affections of the Pharynx	3	---	---	---	2	---	---	---	2	---	---	---	---	--	--	4	3	--	7
---	---	1	1	---	---	---	---	---	---	---	---	--	a. Quinsy	---	---	1	---	---	1	---	---	---	---	---	---	---	--	--	1	1	--	2
---	---	1	1	1	1	---	---	1	1	---	1	--	b. Tonsilitis	---	---	2	1	1	1	1	---	---	---	---	1	---	--	--	4	3	--	7
1	---	1	---	1	1	---	1	1	---	---	---	--	Affections of the Œsophagus	---	---	1	---	---	---	---	2	---	1	2	---	---	--	--	4	2	--	6
---	1	3	3	1	4	3	1	1	1	3	5	--	Ulcer of the Stomach	---	---	---	---	---	1	6	2	9	5	2	---	1	--	--	15	11	--	26
---	1	2	1	---	1	2	2	1	1	---	2	--	Other Affections of the Stomach, (Cancer excepted)	2	1	2	---	---	---	2	---	2	---	4	---	---	--	--	7	6	--	13
19	8	8	12	7	9	3	14	9	6	3	4	--	a. Gastritis	19	8	3	1	1	---	5	2	11	21	16	17	2	1	--	38	64	--	102

1	---	---	---	---	---	---	---	1	---	---	1	--	b. Gastric Catarrh	---	---	---	1	---	---	---	---	---	---	2	---	---	--	--	2	1	--	3
---	---	---	---	2	1	1	1	---	---	1	---	--	c. Gastric Hemorrhage	---	---	---	---	---	---	2	1	---	1	2	---	---	--	--	2	4	--	6
12	9	6	9	4	11	10	7	9	8	10	7	--	d. Indigestion	57	10	4	1	---	--	1	1	5	3	9	8	3	--	--	49	53	--	102
1	6	2	1	5	5	15	10	9	4	3	5	--	Diarrhœa and Enteritis (under 2 years)—	54	12	---	---	---	---	---	---	---	---	---	---	---	--	--	39	27	--	66
---	1	---	---	---	---	2	5	---	1	1	1	--	a. Colitis	11	---	---	---	---	---	---	---	---	---	---	---	---	--	--	6	5	--	11
2	2	5	1	7	42	152	102	60	16	6	2	--	b. Cholera Infantum	355	42	---	---	---	---	---	---	---	---	---	---	---	--	--	197	200	--	397
---	4	3	2	1	7	36	28	12	7	3	2	--	c. Entero Colitis	83	22	---	---	---	---	---	---	---	---	---	---	---	--	--	58	47	--	105
4	4	3	5	5	6	15	19	11	8	3	5	--	d. Enteritis	75	13	---	---	---	---	---	---	---	---	---	---	---	--	--	43	45	--	88
3	5	9	5	7	26	61	50	36	31	10	3	--	e. Gastro-Enteritis	210	36	---	---	---	---	---	---	---	---	---	---	---	--	--	133	113	--	246
2	---	1	1	1	9	22	25	9	6	---	---	--	f. Diarrhœa	67	9	---	---	---	---	---	---	---	---	---	---	---	--	--	39	37	--	76
1	1	1	1	2	3	5	6	5	5	2	2	--	Diarrhœa and Enteritis (2 yrs. over)	---	---	8	3	---	3	3	1	2	6	4	4	---	--	--	17	17	--	34
1	1	1	---	---	---	---	3	---	2	1	1	--	a. Colitis	---	---	---	---	---	---	1	---	2	4	2	1	---	--	--	2	8	--	10
2	1	---	1	2	3	8	11	5	4	2	2	--	b. Diarrhœa	---	---	3	---	---	---	1	---	2	5	13	12	5	--	--	14	27	--	41
1	3	2	1	2	---	6	7	---	3	---	---	--	c. Enteritis	---	---	3	2	---	1	---	3	2	---	9	5	---	--	--	8	17	--	25
---	3	---	1	---	3	1	6	1	1	---	---	--	d. Entero-Colitis	---	---	4	---	---	---	1	2	2	2	3	2	---	--	--	6	10	--	16
1	3	3	3	2	5	7	8	1	1	---	1	--	e. Gastro-Enteritis	---	---	5	5	---	2	---	3	2	4	9	4	1	--	--	16	19	--	35
													Hernias: Intestinal Obstructions—																			
2	2	4	4	5	5	5	6	2	1	7	4	--	a. Hernia	4	1	---	---	2	---	5	6	8	4	9	6	1	--	1	21	26	--	47
---	---	---	1	1	1	1	1	---	---	---	---	--	b. Volvulus	2	---	---	1	---	---	1	---	1	---	---	---	---	--	--	3	2	--	5
15	4	9	7	3	6	11	12	12	6	6	8	--	c. Intestinal Obstruction	10	2	4	7	6	7	6	8	14	13	15	7	---	--	--	56	43	--	99
3	3	---	3	3	---	1	1	4	1	2	4	--	Other Affections of Intestines	5	---	6	1	---	3	---	1	1	1	2	5	---	--	--	18	7	--	25
---	---	1	---	2	1	---	---	---	---	---	---	--	a. Intestinal Hemorrhage	2	---	---	---	---	---	1	---	1	---	---	---	---	--	--	1	3	--	4
1	---	1	---	---	---	1	---	---	---	---	---	--	Acute Yellow Atrophy of Liver	---	---	---	---	---	1	1	---	1	---	---	---	---	--	--	---	3	--	3
---	1	---	---	---	---	---	---	---	---	---	1	--	Tumors, Hydatid, of the Liver	---	---	---	---	---	---	---	2	---	---	---	---	---	--	--	---	2	--	2
5	12	14	10	5	12	8	17	8	9	6	12	--	Cirrhosis of the Liver	---	---	---	---	---	5	10	15	40	26	20	2	---	--	--	85	33	--	118
---	1	---	2	1	2	1	---	1	---	---	---	--	a. Hepatitis, interstitial or chronic	---	---	---	---	---	---	---	2	3	---	2	1	---	--	--	2	6	--	8
---	---	---	---	---	---	---	---	---	---	---	1	--	b. Amyloid Degen. of the Liver	1	---	---	---	---	---	---	---	---	---	---	---	---	--	--	---	1	--	1
---	1	---	1	---	---	---	---	---	---	---	---	--	c. Slow Atrophy of Liver	---	---	---	---	---	---	---	---	---	---	2	---	---	--	--	1	1	--	2
2	---	3	1	4	2	2	3	2	1	---	1	--	Biliary Calculi	---	---	---	---	---	---	4	5	3	6	2	1	---	--	--	4	17	--	21
3	2	1	6	5	2	4	5	3	3	2	4	--	Other Affections of the Liver	1	1	---	---	2	2	2	8	5	13	3	3	---	--	1	17	24	--	41
1	---	---	1	1	---	1	---	---	---	---	2	--	a. Abscess	---	---	---	---	---	---	1	1	1	---	2	1	---	--	--	3	3	--	6
---	---	---	---	---	1	---	---	---	---	---	---	--	b. Tumor	---	---	---	---	---	---	---	---	---	---	1	---	---	--	--	---	1	--	1
---	---	1	---	---	---	---	---	---	---	---	---	--	c. Hypertrophy	---	---	---	---	---	---	---	---	---	---	1	---	---	--	--	---	1	--	1
---	---	---	2	1	---	1	---	1	1	1	---	--	d. Jaundice (3 mos. and over)	---	---	---	1	---	---	---	1	1	1	---	2	1	--	--	3	4	--	7

TABLE XI—CONTINUED—1908.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Month not stated.	CAUSES.	Under 1.	1 to 2.	2 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	100 and over.	Age not stated.	Male.	Female.	Sex not stated.	Total.
					2		1		1				e. Acute Hepatitis (3 mos. & over)								1		3						3	1		4
		1				1		2			1		Affections of the Spleen					1	2	1	1								2	3		5
2	7	1	3	5	4	2	2	2	2	2			Peritonitis, Simple (Puerperal excepted)	2			2	7	2	3	5	4	3	2	2				10	22		32
				1	2	1				1			Other Affect. of the Digestive App. (Cancer and Tubercle excepted)	1							2	1	1						3	2		5
													Appendicitis and Abscess of the Iliac Fossa—																			
6	7	8	2	10	6	14	5	6	7	7	6		a. Appendicitis			1	7	18	19	14	12	7	4	1				1	49	35		84
													CLASS VI. — DISEASES OF THE GENITO-URINARY APPARATUS AND ITS ADNEXA.																			
11	10	13	13	10	4	14	12	18	10	15	13		Nephritis, Acute	9	1	3	8	7	16	16	19	22	18	19	5				71	72		143
71	94	76	69	69	55	67	55	63	73	83	77		Bright's Disease	3		2	1	17	44	64	105	146	208	169	78	11		4	482	370		852
1						1		1			1		a. Albuminuria							1			2		1				2	2		4
4	2	6	6	2	4	3	2	3	1	3	3		b. Uræmia	2				2	1	3	2	7	4	11	7				21	18		39
2	6	4	3	4	4	1	1	1	1	1	1		Other Diseases of the Kidneys and their Adnexa	1	1				1	3	3	3	7	5	4	1			19	10		29
	1		1										a. Myoma and Abscess of Kidney								2									2		2

											1		b. Congestion, renal										1						1			1
3	1								2	1			Calculi of the Urinary Tract								1		3		3				6	1		7
	1	1	1		1			1		2	1		Diseases of the Bladder						1			1		2	3	1			5	3		8
7	4	7	7	1	2	10	5	10	1		4		a. Cystitis								1	4	10	24	14	5			56	2		58
1						1		1					b. Retention of Urine	1									1	1					3			3
		1				1	2			1			Diseases of the Urethra							2	2	1							3	2		5
4	5	1	5	3	2	5	3	2	5	4	1		Diseases of the Prostate									3	6	23	8				40			40
											1		Non-venereal Diseases of Male Genital Organs	1															1			1
								1					Hemorrhage, Uterine (non-puerperal)						1											1		1
2	1				1	4	5	3	2	1	2		Tumor, Uterine (non-cancerous)	1					2	4	4	4	2	2	2					21		21
			1		1	1					1		Other Diseases of the Uterus							1	2					1				4		4
					1		1	1	2		1		a. Pelvic Abscess						3	3										6		6
1	3		1	1	1		1		2	1	2		Cysts, and other Tumors of Ovary							3	5	3		2						13		13
	1			1		1				1			Other Diseases of the Female Genital Organs						2		2									4		4
			2	1	1		2			1			a. Pyosalpinx						2	2	3									7		7
		2				1							b. Salpingitis						3											3		3
1									1				Non-puerp. Diseases of the Breast (Cancer excepted)	1									1							2		2
													CLASS VII.—THE PUERPERAL STATE.																			
1	1	2	1	5	2	2	1	1	2	1	2		Accidents of Pregnancy					1	5	13	2									21		21
			1		1		1	1					a. Abortion						2	2										4		4
						1				1			b. Tubal Pregnancy							1	1									2		2
	2	1	2	1		1		2	1				Hemorrhage, Puerperal						2	7	1									10		10
			1	1		1				1	1		Other Accidents of Labor						2	3										5		5
			1							1			a. Dystocia					1		1										2		2
1				1	1			2		2			b. Placenta Previa						4	3										7		7
2	6	3	5		3	2	2		2	2	5		Septicæmia, Puerperal					5	14	8	5									32		32

TABLE XI—CONTINUED—1908.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Month not stated.	CAUSES.	Under 1.	1 to 2.	2 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	100 and over.	Age not stated.	Male.	Female.	Sex not stated.	Total.
1	2	1	3	5	2	3	2	3	6	---	2	--	Albuminuria and Puerperal Eclampsia	---	---	---	---	4	10	15	1	---	---	---	---	---	--	--	---	30	--	30
---	3	1	1	---	---	---	---	1	---	2	---	--	Other Puerperal Accidents	---	---	---	---	1	4	3	---	---	---	---	---	---	--	--	---	8	--	8
													CLASS VIII.—DISEASES OF THE SKIN AND CELLULAR TISSUE.																			
6	4	2	1	3	4	6	4	3	1	3	3	--	Gangrene	---	---	---	---	---	---	---	3	2	4	15	12	4	--	--	25	15	--	40
---	---	---	---	---	1	1	---	---	---	2	1	--	Furuncle (Carbuncle)	1	---	---	---	---	---	---	1	---	2	---	1	---	--	--	3	2	--	5
1	1	1	---	---	1	---	2	---	---	---	2	--	Abscess	3	---	---	---	---	3	---	---	1	1	---	---	---	--	--	5	3	--	8
1	2	1	---	1	3	1	1	1	2	1	---	--	Other Diseases of the Skin	7	---	---	---	---	---	1	1	3	2	---	---	---	--	--	4	10	--	14
													CLASS IX.—DISEASES OF THE ORGANS OF LOCOMOTION.																			
---	1	---	---	---	1	---	---	---	1	---	1	--	Affections of the Bones (non-tuberculous)	---	---	---	---	1	---	---	---	1	1	---	1	---	--	--	---	4	--	4
1	---	2	2	2	---	1	1	1	1	---	1	--	a. Abscess Mastoid	2	3	1	1	---	1	2	1	1	---	---	---	---	--	--	7	5	--	12

---	1	3	1	1	1	3	2	1	---	---	1	--	b. Rachitis	9	2	3	---	---	---	---	---	---	---	---	---	---	--	--	9	5	--	14
---	1	---	---	---	---	1	---	---	---	1	---	--	c. Osteo-Myelitis	---	1	---	---	---	1	1	---	---	---	---	---	---	--	--	3	---	--	3
---	---	---	1	---	---	1	1	---	---	---	---	--	Arthritis, Other Affections of the Joints (Tubercle and Rhm. exc.)	---	---	---	---	---	---	---	---	---	1	2	---	---	--	--	3	---	--	3
													CLASS X.—MALFORMATIONS.																			
9	6	10	7	1	12	7	13	11	12	8	7	--	Malformations, Congenital (Still-births excepted)	99	2	1	---	1	---	---	---	---	---	---	---	---	--	--	47	56	--	103
2	2	1	2	1	---	3	1	1	2	3	---	--	a. Hydrocephalus	14	3	1	---	---	---	---	---	---	---	---	---	---	--	--	13	5	--	18
---	---	3	---	2	2	---	1	2	---	1	2	--	b. Cyanosis	13	---	---	---	---	---	---	---	---	---	---	---	---	--	--	7	6	--	13
2	---	---	4	---	---	2	---	---	---	1	---	--	c. Spina Bifida	9	---	---	---	---	---	---	---	---	---	---	---	---	--	--	4	5	--	9
1	1	2	1	3	4	---	3	2	---	2	2	--	d. Open Foramen Ovale	21	---	---	---	---	---	---	---	---	---	---	---	---	--	--	14	7	--	21
---	---	---	---	---	---	1	---	---	1	---	---	--	e. Imperforate Anus	2	---	---	---	---	---	---	---	---	---	---	---	---	--	--	2	---	--	2
													CLASS XI.—EARLY INFANCY.																			
17	19	13	14	15	11	10	23	25	9	8	8	--	Congenital Debility	172	---	---	---	---	---	---	---	---	---	---	---	---	--	--	102	70	--	172
8	3	3	3	1	2	1	3	4	2	2	1	--	a. Atelectasis	33	---	---	---	---	---	---	---	---	---	---	---	---	--	--	17	16	--	33
2	1	2	2	3	4	4	---	3	1	4	2	--	b. Icterus Neonatorum	28	---	---	---	---	---	---	---	---	---	---	---	---	--	--	21	7	--	28
36	54	42	38	43	27	38	42	39	43	38	33	--	c. Premature Birth	473	---	---	---	---	---	---	---	---	---	---	---	---	--	--	270	203	--	473
5	9	7	3	3	1	6	---	5	4	5	2	--	Other Diseases of Early Infancy	50	---	---	---	---	---	---	---	---	---	---	---	---	--	--	28	22	--	50
1	1	1	3	1	---	1	1	---	---	1	1	--	a. Umbilical Hemorrhage	11	---	---	---	---	---	---	---	---	---	---	---	---	--	--	6	5	--	11
6	6	7	4	16	11	19	12	11	6	12	11	--	Inanition under 3 months	121	---	---	---	---	---	---	---	---	---	---	---	---	--	--	70	51	--	121
													CLASS XII.—OLD AGE.																			
33	33	32	17	26	17	29	25	15	30	22	25	--	Senile Debility	---	---	---	---	---	---	---	---	3	21	83	137	55	3	2	124	180	--	304
													CLASS XIII. — AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																			
---	---	---	4	2	1	3	1	1	---	---	3	--	Suicide by Poison	---	---	---	---	---	6	1	4	4	---	1	---	---	--	--	6	9	--	15
---	1	---	---	2	2	---	---	---	---	---	1	--	a. Narcotic Poison	---	---	---	---	---	---	---	---	3	2	1	---	---	--	--	4	2	--	6

TABLE XI—CONTINUED—1908.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Month not stated.	CAUSES.	Under 1.	1 to 2.	2 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	100 and over.	Age not stated.	Male.	Female.	Sex not stated.	Total.
2	3	5	4	4	5	8	3	9	7	6	3		b. Carbolic Acid					6	15	12	14	8	3	1					42	17		59
		1											Suicide by Asphyxia							1									1			1
1	3	2	1	3	1		1	2	3	2			a. Inhalation of Illuminating Gas						3	4	7	4		1					15	4		19
2	2	1	1	2	2	3	1		2	1			Suicide by Hanging or Strangulation						3	3	4	5		1		1			11	6		17
	1		1	1	4	2	2	3	2	2			Suicide by Drowning					2	4	2	2	3	3	1	1				10	8		18
2	2	7	7	3	4	1	3	2	7	2	5		Suicide by Firearms					1	13	7	8	9	3	2	1			1	42	3		45
2		3	1		3	1	1			1	1		Suicide by Cutting Instruments						1	4	4	2	2						13			13
1										1			Suicide by Jumping from High Places						2										2			2
							1	1				1	Other Suicides							1		1	1						3			3
													Fractures, not specified —																			
	1								1				a. Arms and Legs								2								2			2
3	2	1											b. Femur										1	4	1				3	3		6
3	5		1	1	1		1		1				c. Hip							1			4	5	3				5	8		13
		1						1					d. Neck					1		1									2			2
2		1											e. Ribs										2	1					3			3
3	3	1	1	6		1	2	2	2				f. Skull			1	4	2	3	3	3	3	1	1					16	5		21
2	1	1		2	1			1					g. Vertebra				1	1	4	1				1					7	1		8
				1									Dislocations											1					1			1
3	4	3	4	4	3	9	9	3	1	8	5		Other Accidental Traumatisms	3	1	3	3	10	8	8	6	1	6		1			1	46	5		51
						1		1	2	1			a. Cerebral Concussion			1			1	1				1	1				4	1		5
10	2	5	8	12	10	12	9	14	14	17	17		b. Fall	2	3	3	1	5	15	6	15	8	13	25	27	7			79	51		130

---	1	---	---	---	---	---	---	---	---	---	---	--	c. Fall from polo	---	---	---	---	---	1	---	---	---	---	---	---	---	--	--	1	---	--	1
---	1	---	1	---	2	2	1	1	---	---	---	--	d. Fall from window	---	1	---	---	---	---	4	2	---	---	1	---	---	--	--	7	1	--	8
---	1	---	---	---	3	---	---	2	---	---	---	--	e. Kick of Horse	---	---	---	---	---	2	1	1	2	---	---	---	---	--	--	6	---	--	6
---	---	---	---	---	1	---	---	---	---	---	---	--	f. Live Electric Wire	---	---	---	---	---	---	1	---	---	---	---	---	---	--	--	1	---	--	1
11	15	13	8	6	14	11	18	18	15	17	13	--	g. Railway, Steam	---	1	1	2	14	38	31	36	14	10	4	1	---	--	7	148	11	--	159
---	2	1	---	1	3	2	4	5	4	3	3	--	h. Railway, Street	---	---	---	2	---	8	5	5	3	3	1	---	---	--	1	24	4	--	28
---	1	1	---	1	1	2	1	3	2	5	---	--	i. Automobile, Accidents	---	---	1	4	4	---	---	1	---	2	---	1	---	--	--	13	4	--	17
3	---	---	2	1	3	2	1	2	1	1	---	--	j. Injuries by Vehicle	---	1	2	1	---	4	1	3	2	---	2	---	---	--	--	14	2	--	16
---	1	---	---	4	1	2	---	---	3	1	---	--	k. Gun Shot	---	---	1	2	3	4	1	1	---	---	---	---	---	--	--	12	---	--	12
7	5	5	2	3	4	9	5	7	11	14	12	--	Burns and Scalds	4	6	31	6	3	8	4	4	5	3	5	4	---	--	1	37	47	--	84
---	---	---	---	2	3	12	4	---	---	---	---	--	Heat and Sunstroke	2	1	1	---	---	---	2	2	3	3	5	2	---	--	--	13	8	--	21
3	1	1	---	---	---	---	---	---	---	---	1	--	Cold and Freezing	---	---	---	---	---	1	---	1	3	1	---	---	---	--	--	5	1	--	6
---	---	2	---	---	2	3	1	---	---	---	---	--	Electrical Disturbances	---	---	---	---	4	2	---	1	1	---	---	---	---	--	--	7	1	--	8
9	6	7	6	17	19	32	17	12	6	2	4	5	Accidental Drowning	---	1	10	10	40	25	19	16	9	5	---	1	---	--	6	126	16	--	142
---	---	---	---	---	1	---	---	---	---	---	---	--	Starvation and Privation	---	---	---	---	---	---	---	1	---	---	---	---	---	--	--	---	1	--	1
2	1	4	2	1	---	---	---	1	4	4	1	--	Absorption of Deleterious Gases (Suicide excepted)	---	---	---	---	2	3	7	1	3	2	1	1	---	--	--	19	1	--	20
4	5	4	3	5	3	1	7	10	2	3	3	--	Other Acute Poisonings	4	1	11	2	2	7	5	2	9	---	6	1	---	--	--	28	22	--	50
1	1	---	---	2	---	---	---	---	1	---	---	--	Other External Violence	---	1	---	---	---	1	---	2	---	---	1	---	---	--	--	4	1	--	5
---	---	4	---	1	1	1	4	7	---	1	3	--	Suffocation	11	1	---	---	---	---	1	---	5	1	2	1	---	--	--	15	7	--	22
15	11	14	8	10	9	11	10	9	12	3	8	--	Injuries at birth	120	---	---	---	---	---	---	---	---	---	---	---	---	--	--	80	40	--	120
---	---	---	---	---	---	2	---	---	---	---	1	--	Capital Punishment	---	---	---	---	---	---	1	1	---	---	---	---	---	--	1	3	---	--	3
3	---	1	1	---	---	1	3	2	2	1	1	--	Homicides	3	---	3	---	---	2	3	2	---	2	---	---	---	--	--	6	9	--	15
---	1	3	4	2	1	---	1	1	---	1	2	--	a. Gunshot	---	---	---	1	3	6	3	2	1	---	---	---	---	--	--	10	6	--	16
1	1	1	1	---	---	---	---	---	1	---	1	--	b. Stab or Cut	---	---	---	---	1	2	2	---	1	---	---	---	---	--	--	6	---	--	6
													Class XIV. — Ill-Defined Diseases.																			
---	1	1	1	1	1	1	---	---	---	---	1	--	Dropsy	---	---	1	---	---	---	1	1	---	---	1	3	---	--	--	6	1	--	7
---	1	---	---	1	2	1	4	3	3	2	1	--	Inanition (over 3 months)	15	2	---	---	---	---	---	---	---	---	1	---	---	--	--	9	9	--	18
5	1	2	5	4	4	15	19	10	15	11	2	--	Marasmus (over 3 months)	81	8	2	---	1	---	---	---	---	---	---	1	---	--	--	57	36	--	93
3	5	4	4	3	4	5	6	4	2	4	5	--	Ill-defined	18	3	2	---	3	2	2	4	5	7	1	2	---	--	--	30	19	--	49
4	8	1	4	4	1	1	4	4	4	2	5	1	Causes Unknown	22	1	1	---	---	2	4	3	1	3	2	2	---	--	2	30	13	--	43

TABLE XII.

OCCUPATIONS AND AGES OF DECEDENTS—1908.

OCCUPATIONS.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	100 and over.	Age not stated.	Total, 1908.	Total, 1907.	Total, 1906.	Total, 1905.	Total, 1904.	Total, 1903.	Total, 1902.	Total, 1901.	Total, 1900.	Total, 1899.
I. Tillers of the Soil.																					
Farmers	4	21	26	49	84	143	207	156	17	--	1	708	755	704	682	769	766	717	776	828	721
Florists	----	1	1	1	2	2	----	1	----	--	--	8	9	8	5	1	8	5	4	5	4
Gardeners	----	1	----	2	14	17	12	6	1	--	--	53	45	44	54	37	49	40	19	31	21
II. Professional and Personal.																					
Actors and Actresses	----	----	1	----	----	----	----	----	----	--	--	1	6	1	3	4	5	1	2	4	4
Architects	----	----	----	----	1	----	2	----	----	--	--	3	4	2	4	4	4	3	----	2	3
Artists	----	1	1	1	----	1	----	1	----	--	--	5	6	1	6	7	6	4	4	3	5
Authors	----	----	----	----	1	----	----	----	----	--	--	1	----	1	1	2	1	1	----	3	----
Chemists	----	----	----	----	1	----	1	----	----	--	--	2	4	1	2	----	----	----	2	----	----
Civil Engineers	----	3	----	----	----	1	----	1	----	--	--	5	2	1	3	----	6	4	2	4	4
Clergymen	----	1	----	2	4	6	5	2	1	--	--	21	20	18	29	21	27	24	19	34	25
Dentists	----	2	1	----	4	1	1	----		--	--	9	9	4	6	9	9	6	4	7	1
Designers	----	----	----	----	----	----	----	----	----	--	--	----	2	1	2	3	1	3	1	----	2
Draughtsmen	----	3	----	1	----	----	----	----	----	--	--	4	5	2	2	3	3	2	3	----	1
Electricians	1	4	3	3	----	----	----	----	----	--	--	11	17	9	10	7	6	5	9	8	4
Inspectors	----	3	3	1	6	5	1	----	----	--	--	19	13	12	5	14	7	3	----	6	5
Inventors	----	----	----	----	----	2	1	----	----	--	--	3	3	1	2	2	4	3	----	2	----
Journalists (inc. Ed'rs & Reporters)	----	----	3	----	1	1	1	----	----	--	--	6	6	5	11	7	2	5	7	10	5
Lawyers	----	1	----	4	1	3	4	2	----	--	--	15	19	22	21	24	20	9	24	18	20
Musicians	----	3	4	1	1	1	1	----	----	--	--	11	15	17	13	12	19	10	17	13	10

Photographers	----	----	1	----	----	1	----	----	----	--	--	2	2	8	2	3	8	3	4	----	2
Physicians	----	2	7	3	5	4	7	4	1	--	--	33	26	32	26	36	19	22	27	28	25
Publishers	----	----	----	----	1	----	----	----	----	--	--	1	2	1	2	----	1	----	1	2	1
Stenographers	1	4	3	1	----	1	----	----	----	--	--	10	11	16	6	8	8	7	8	4	5
Students	14	7	----	----	----	----	----	----	----	--	--	21	15	16	25	40	36	39	43	15	19
Teachers	2	9	3	8	5	7	4	----	----	--	--	38	39	39	43	47	30	32	36	39	43
Telegraph Operators	----	1	1	----	----	1	----	----	----	--	--	3	4	3	5	5	2	3	8	2	5
Veterinarians	----	----	----	1	2	----	----	----	----	--	--	3	2	1	3	4	2	2	----	4	----
III. Optional Activity.																					
Agents	----	3	2	7	3	4	3	2	----	--	--	24	16	21	25	42	27	15	14	20	27
Auctioneers	----	----	----	----	1	----	----	----	----	--	--	1	----	----	----	----	----	1	1	----	1
Bankers	----	----	1	----	1	2	2	1	----	--	--	7	7	6	6	5	5	12	3	9	4
Bartenders	----	3	13	7	1	----	----	----	----	--	--	24	24	28	25	25	21	10	17	10	16
Bottlers	----	----	2	1	1	1	----	----	----	--	--	5	2	1	5	----	4	1	4	2	----
Brokers	----	----	1	2	3	3	3	----	----	--	--	12	6	5	4	3	3	4	8	2	4
Builders	----	----	2	----	1	1	4	2	----	--	--	10	4	10	12	11	9	10	7	3	6
Contractors	----	----	1	----	2	4	2	2	----	--	--	11	21	23	22	16	21	12	11	14	13
Druggists	----	2	2	1	4	----	----	1	----	--	--	10	15	14	17	16	15	14	8	14	14
Grocers	----	----	1	----	4	3	2	1	----	--	--	11	15	10	12	17	13	18	11	10	11
Hotel Clerks	----	----	----	----	----	----	----	----	----	--	--	----	1	----	3	----	7	----	1	1	----
Hotelkeepers	----	2	----	2	2	2	----	1	----	--	--	9	17	21	18	22	11	8	22	12	12
Insurance Agents	----	1	----	3	4	5	4	----	----	--	--	17	12	16	8	18	15	17	14	18	16
Liquor Dealers	----	1	3	4	5	5	----	----	----	--	--	18	17	15	13	22	16	19	24	18	22
Liverymen	----	----	1	----	2	2	----	----	----	--	--	5	7	6	6	4	8	13	8	10	5
Mail Carriers	----	1	3	1	5	5	----	----	----	--	--	15	6	7	2	----	7	5	4	----	----
Manufacturers	----	1	1	5	6	8	12	4	----	--	--	37	36	40	20	43	42	37	56	53	54
Merchants	----	3	13	31	32	40	25	12	3	--	--	159	162	148	150	144	146	122	141	119	139
Opticians	----	----	----	----	1	1	1	----	----	--	--	3	1	1	----	----	2	----	----	3	----
Oystermen	----	2	1	----	4	1	5	2	----	--	--	15	16	11	16	8	9	10	9	16	8
Piano Tuners	----	----	----	----	----	----	----	----	----	--	--	----	3	----	----	1	2	1	----	1	----
Postmasters	---	----	----	----	----	3	2	----	----	--	--	5	8	3	2	7	1	3	1	2	2
Undertakers	----	----	----	1	----	2	----	1	----	--	--	4	1	3	7	4	4	6	1	3	8

TABLE XII—CONTINUED—1908.

OCCUPATIONS.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	100 and over.	Age not stated.	Total, 1908.	Total, 1907.	Total, 1906.	Total, 1905.	Total, 1904.	Total, 1903.	Total, 1902.	Total, 1901.	Total, 1900.	Total, 1899.
IV. Outdoor—Local.																					
Brickmakers	....	....	1	2	1	1	....	....	....	..	..	5	2	4	46	47	13	49	28	6	32
Brickmasons	1	1	2	8	14	10	6	1	....	..	..	43	58	14	5	2	4	....	11	1	2
Bridge Builders	....	....	2	2	....	....	....	....	....	..	..	4	6	7	....	....	....	....	....	....	....
Butchers	....	3	4	6	5	7	3	....	....	..	..	28	28	24	23	32	32	24	26	33	24
Carpenters	1	9	21	22	31	46	39	23	1	..	..	193	202	205	191	172	153	147	179	151	144
Charcoal Burners	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	2	....	....	1	....
Marble Cutters	....	....	....	....	....	1	1	....	....	..	..	2	....	3	....	1	1	10	8	9	2
Millwrights	....	....	....	1	....	1	1	1	....	..	..	4	3	5	3	4	3	3	3	....	2
Quarrymen	....	....	....	....	....	3	1	....	....	..	..	4	6	10	12	6	7	9	14	3	11
Roofers	....	....	2	....	....	1	....	....	....	..	..	3	3	....	1	1	1	....	1	3	1
Slaters	....	1	....	....	1	1	....	....	....	..	..	3	1	1	....	4	1	1	....	....	2
Stonemasons	....	2	2	8	6	7	5	5	....	..	..	36	41	86	45	61	82	36	42	55	43
V. Indoor—Active.																					
Bakers	....	2	6	5	1	2	1	1	....	..	..	18	35	31	21	14	21	21	15	12	19
Blacksmiths	....	....	5	10	11	12	12	9	1	..	..	60	60	53	68	82	62	58	59	65	69
Boilermakers	....	2	....	3	....	....	....	....	....	..	..	5	9	5	4	8	1	9	7	6	3
Brassworkers	1	1	....	4	8	2	1	....	....	..	..	17	16	22	12	10	13	17	6	7	3
Brewers	....	....	....	1	2	....	....	....	....	..	..	3	5	....	3	2	....	5	2	4	3
Cabinetmakers	....	....	1	3	2	3	3	2	....	..	..	14	11	12	22	12	16	13	11	10	11
Carriagemakers	....	....	1	1	2	4	9	4	....	..	..	21	17	80	16	14	22	28	17	14	28
Cartridgemakers	....	....	....	....	....	....	....	....	....	..	..	....	....	....	....	....	....	....	....	1	....
Carvers	....	....	....	....	....	1	....	....	....	..	..	1	....	1	....	2	....	....	....	4	2
Caterers	....	....	....	2	....	....	....	....	....	..	..	2	1	....	....	....	1	....	....	1	....
Confectioners			1		3	1	1					6	2	....	1	....	1	2	4	....	....

Cooks and Housemaids	10	16	13	20	12	17	12	1	----	--	2	103	118	126	120	115	113	182	153	120	83
Coopers	----	----	3	----	1	1	----	----	----	--	--	5	3	7	4	6	3	5	6	7	5
Cutlers	----	----	----	----	1	1	1	1	----	--	--	4	8	2	5	14	7	9	3	7	8
Dyers	----	----	----	----	----	----	----	1	----	--	--	1	6	9	10	7	5	5	4	14	10
Electrotypers	----	1	----	----	----	----	----	----	----	--	--	1	----	----	----	----	----	----	----	2	----
Gunsmiths	1	2	1	5	1	3	----	----	----	--	--	13	8	8	10	11	12	3	8	----	6
Hatters	4	9	8	18	20	12	12	2	1	--	--	86	85	78	73	81	73	55	60	58	59
Lathers	----	----	----	----	----	----	----	----	----	--	--	----	3	1	1	2	1	2	2	1	1
Locksmiths	2	2	4	2	3	1	2	----	----	--	--	16	10	11	5	10	10	8	3	4	6
Machinists	1	28	19	23	16	25	15	10	1	--	1	139	170	178	169	123	134	142	145	120	83
Mechanics	1	24	17	16	19	34	30	7	1	--	--	149	192	157	118	168	161	121	139	180	134
Metalworkers	1	2	4	3	1	----	1	----	----	--	--	12	41	36	80	48	66	58	38	3	28
Miners	----	----	----	----	1	2	----	----	1	--		4	3	1	1	3	4	3	1	----	2
Moulders	----	5	11	17	13	11	9	3	----	--	--	69	95	64	87	99	60	64	67	68	56
Organmakers	----	----	----	----	----	----	----	----	----	--	--	----	----	----	3	1	1	----	----	----	----
Painters	1	4	10	21	13	22	15	1	1	--	--	88	123	111	110	107	95	71	98	91	79
Papermakers	----	2	1	----	1	1	3	1	----	--	--	9	7	8	10	8	6	8	3	9	3
Patternmakers	----	----	1	----	----	1	4	1	----	--	--	7	10	4	7	10	15	13	4	7	6
Plasterers	----	----	----	----	----	----	----	----	----	--	--	----	1	3	2	1	2	4	----	----	----
Platers	----	4	1	4	2	3	2	----	----	--	--	16	10	5	4	8	5	5	8	9	6
Plumbers	3	9	8	10	3	3	1	1	----	--	--	28	34	33	30	33	26	18	30	19	18
Sailmakers	----	----	----	----	1	----	----	1	1	--	--	3	1	----	----	4	2	----	1	----	1
Shipbuilders	----	----	----	----	----	1	2	2	----	--	--	5	----	4	13	5	14	11	11	8	11
Tanners	----	----	----	----	----	----	----	----	----	--	--	----	1	2	2	3	2	----	----	----	2
Tinsmiths	----	----	5	1	----	4	1	1	----	--	--	12	19	19	13	15	11	8	12	6	21
Upholsterers	----	----	2	----	----	1	1	----	----	--	--	4	----	4	3	1	1	3	5	5	2
Weavers	3	7	7	5	5	4	3	3	----	--	--	37	43	33	34	30	43	41	40	35	35
Wheelwrights	----	1	----	----	----	----	1	1	----	--	--	3	4	8	11	3	4	7	4	5	3
Wiredrawers	----	1	1	2	----	1	----	----	----	--	--	5	5	7	13	5	4	2	4	4	3
VI. Indoor—Activity Restricted.																					
Barbers	2	1	6	2	4	1	1	----	----	--	2	19	25	24	14	19	24	19	24	16	15
Bookbinders	----	2	----	2	----	1	----	----	----	--	--	5	2	4	1	2	2	2	4	5	4
Bookkeepers	3	15	8	2	4	6	4	1	----	--	--	43	48	42	43	26	39	29	42	35	30

TABLE XII—CONTINUED—1908.

OCCUPATIONS.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	100 and over.	Age not stated.	Total, 1908.	Total, 1907.	Total, 1906.	Total, 1905.	Total, 1904.	Total, 1903.	Total, 1902.	Total, 1901.	Total, 1900.	Total, 1899.
Boxmakers	1	----	1	1	2	----	----	----	----	--	--	5	7	11	6	----	8	6	5	2	9
Brassfinishers	----	----	2	3	----	1	1	----	----	--	--	7	2	----	2	6	6	----	----	9	----
Burnishers	2	8	7	12	10	8	3	1	----	--	--	51	67	40	10	7	8	6	15	34	7
Cigarmakers	----	2	3	5	3	1	4	----	----	--	--	18	25	22	16	17	14	15	14	13	16
Clerks and Salesmen	25	57	40	31	27	11	7	----	----	--	1	199	216	207	198	187	147	157	147	144	113
Clock and Watchmakers	3	5	4	1	1	4	4	----	----	--	--	22	22	10	19	19	11	12	20	24	9
Diesinkers	----	1	2	----	----	----	----	1	----	--	--	4	----	----	6	4	2	2	2	1	----
Dressmakers	----	3	5	6	8	4	4	3	----	--	--	33	55	26	22	29	38	39	32	30	29
Engravers	----	2	----	----	----	----	----	----	1	--	--	3	5	3	4	6	2	3	2	6	1
Factory Operatives	43	84	39	36	38	24	13	1	1	--	--	279	269	275	263	240	247	218	224	235	185
Furriers	----	1	----	1	----	----	----	----	----	--	--	2	3	4	2	3	3	----	4	1	2
Grinders	----	----	7	2	4	1	----	----	----	--	--	14	21	11	11	12	10	13	12	7	10
Harnessmakers	----	----	----	2	1	2	1	----	----	--	--	6	8	14	7	15	17	11	9	11	8
Housekeepers	28	246	348	381	498	575	449	198	30	--	9	2762	2803	2670	2386	2256	2505	2248	2417	2343	2299
Jewelers	----	----	----	1	1	----	1	----	----	--	--	3	3	8	4	5	4	4	5	8	6
Laundry Workers	1	1	2	6	3	1	----	----	----	--	--	14	13	14	12	12	9	13	16	14	10
Milliners	----	4	1	----	1	----	----	----	----	--	--	6	5	5	6	3	8	9	16	14	3
Nurses	----	5	2	3	9	10	3	----	1	--	--	33	32	24	26	29	29	26	33	32	14
Printers	1	6	3	4	4	3	1	1	----	--	--	23	31	24	21	18	29	23	15	16	19
Rubber Workers	2	5	4	6	2	4	1	1	----	--	--	25	33	35	27	33	24	30	22	30	34
Shoemakers	----	1	4	3	6	4	11	6	----	--	--	35	46	45	66	56	49	41	44	58	50
Spinners	----	3	----	1	1	2	1	----	----	--	--	8	9	17	6	6	11	5	9	6	4
Tailors	1	1	3	7	8	4	7	3	1	--	--	35	37	20	41	24	24	31	31	30	32
Varnishers	----	----	----	----	----	----	----	----	----	--	--	----	----	----	2	3	1	2	----	3	2
Woolsorters	----	----	----	----	1	----	2	----	----	--	--	3	2	1	2	1	2	----	1	2	3

VII. Occupations at Large.																					
Army Officers							1					1					1			1	1
Baggagemasters						1						1	3	1	2	3		2	2	2	
Brakemen	1	7	4	3	1	1					1	18	31	38	29	36	30	30	27	21	18
Chauffeurs		2										2	3								
Coachmen		1	2	2	3	1	1					10	20	15	17	16	11	12	16	14	12
Conductors	2	5	7	3	1	1	1					20	16	18	14	20	12	10	11	11	6
Custom House Officers						1						1	1	1							
Dairymen															1		2	4	7		
Engineers	1	4	7	10	11	11	4	1	1			60	63	63	44	37	43	39	45	39	33
Expressmen		2	2	1	1	2	1					9	5	4	9	5	6	6	3	9	6
Firemen	2	7	5	5	2							21	26	18	18	18	16	10	20	11	4
Foremen		3	7	11	6	6	4	1				38	51	35	32	25	29	18	24	19	24
Gatetenders						2						2	2	1	7	3	6	2	3	6	3
Hackmen				2		1						3	5	5	5	3			4	5	1
Hostlers		1	4	2	3	2						12	14	21	18	22	14	15	20	14	28
Janitors		1	5	3	6	9	3					27	28	21	10	5	14	32	21	17	18
Laborers	31	132	143	147	160	154	84	25	2		4	882	1019	1022	905	896	800	763	784	783	682
Linemen		2	3		2							7	4	8	7	5	10	5	5	1	4
Motormen		2	5	5	2							14	8	5	6	9	6	4	3	4	2
Pilots					1		1					2			3		1	2	2		
Policemen			2	4	3	3						12	6	9	2	5	5	7	12	6	8
Porters	1				1	2						4	8	11	4	9	2	5	11	4	
Railroad Employes	1	6	4	13	6	8	3	1				42	33	40	43	43	33	27	26	28	23
Sea Captains		1		1		1	2	1				6	12	11	9	21	13	16	12	8	13
Seamen		2		4	2			2			1	11	30	34	29	34	34	25	36	20	22
Sheriffs					1							1			6			4		2	
Teamsters	1	14	23	25	16	20	5	2			1	107	142	125	120	89	96	82	78	67	54
Traveling Salesmen		2	1	3	3	2	1					12	7	7	8	9	9	7	10	9	7
Waiters	1	6	6		1							14	24	11	22	13	8	13	11	10	8
Watchmen			2	3	6	9	6	2				28	24	22	15	21	28	21	20	20	19
Unclassified and not stated	6	19	38	30	41	37	30	8				209	211	218	212	177	136	122	162	178	350

TABLE XIII.

VITAL STATISTICS OF THE COLORED POPULATION BY COUNTIES—1908.

COUNTIES.	BIRTHS.													MARRIAGES.											DEATHS.													
	Male.	Female.	Sex not stated.	Total, 1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.	Average.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.	Average.	Male.	Female.	Sex not stated.	Total, 1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.	Average.
Hartford	35	42	...	77	71	89	80	78	81	95	79	60	66	77.6	35	36	44	27	31	40	35	52	36	28	36.4	40	38	...	78	75	68	65	71	69	63	57	44	65	65.5
New Haven	54	58	...	112	131	113	112	111	105	124	130	133	97	116.8	53	61	61	72	54	67	65	57	62	44	59.6	51	56	...	107	164	135	112	112	99	129	120	128	120	122.6
New London	4	12	...	16	32	27	27	30	28	34	33	37	16	28.0	14	17	21	20	24	14	18	12	15	19	17.4	13	12	...	25	38	27	31	28	37	29	56	45	39	35.5
Fairfield	42	21	...	63	74	75	63	66	69	73	62	59	50	65.4	66	37	37	40	37	28	44	25	29	30	37.3	34	43	...	77	81	79	72	72	86	66	61	74	77	74.5
Windham	9	6	...	15	14	4	7	7	13	8	10	7	6	9.1	4	2	5	8	3	6	3	1	1	3	3.6	3	1	...	4	7	16	12	12	14	7	9	12	11	10.4
Litchfield	7	7	...	14	13	11	20	13	22	25	18	24	11	17.1	5	2	2	9	5	4	7	7	8	4	5.8	7	4	...	11	24	21	19	16	18	23	16	25	18	19.1
Middlesex	...	4	...	4	4	5	3	2	6	4	3	5	6	4.2	5	3	2	1	1	...	3	5	1	1	2.2	7	3	...	10	7	10	13	9	12	7	8	15	13	10.4
Tolland	2	...	...	2	...	2	2	2	1	2	3	2	1	1.7	...	...	1	1	...	...	2	1	2	...	.7	...	1	...	1	1	3	4	1	3	3	6	9	1	3.2
Total	153	150	...	303	339	326	314	309	325	365	338	327	253	319.9	182	158	173	178	155	159	177	160	154	129	162.5	155	158	...	313	397	359	328	321	338	327	333	352	344	341.2

NOTE.—In addition to the above there were mixed marriages: 6 in 1908; 7 in 1907; 4 in 1906; 11 in 1905; 12 in 1904; 10 in 1903; 8 in 1902; 6 in 1901; 6 in 1900.

TABLE XIV.

DEATHS FROM TYPHOID FEVER BY COUNTIES FOR A SERIES OF YEARS.

HARTFORD COUNTY.

TOWNS.	Estimated Population.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.
Hartford	101,150	18	18	30	16	12	19	14	35	44	32	36	20	30	38	32	28	46	39	30	26	26	8	21	21	28
Avon	1,400	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	3	1	----	----	----	----	----	1	1	----
Berlin	4,126	----	2	----	----	1	1	1	1	1	----	----	----	1	1	1	1	----	----	----	1	----	----	2	----	----
Bloomfield	1,677	----	----	----	----	1	----	----	----	2	----	----	----	----	1	----	1	----	2	1	----	----	----	----	1	----
Bristol	11,450	5	5	3	2	3	12	2	3	13	2	2	----	3	2	4	3	5	3	5	4	4	4	----	1	4
Burlington	1,151	----	1	----	----	----	----	1	----	----	----	----	----	----	----	2	----	----	----	----	----	----	1	1	1	2
Canton	2,820	2	2	----	----	----	----	----	----	2	----	----	----	----	----	----	----	1	----	----	2	1	1	4	4	2
East Granby	702	----	1	----	----	----	----	1	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----
East Hartford	7,966	1	3	1	1	1	----	2	1	3	6	2	5	1	2	3	3	8	4	----	1	1	4	1	----	1
East Windsor	3,372	----	1	----	----	----	----	----	----	1	1	----	2	----	----	----	----	1	1	----	----	----	----	----	1	----
Enfield	6,300	----	2	2	4	----	----	5	3	2	1	1	3	1	1	4	1	4	2	3	5	3	----	3	5	4
Farmington	3,452	1	1	----	----	----	1	----	----	----	2	3	----	----	1	1	2	2	----	1	2	----	----	----	1	5
Glastonbury	4,900	1	----	1	----	----	----	1	----	----	1	----	----	----	1	8	1	1	----	3	----	5	1	----	7	1
Granby	1,340	1	----	----	----	----	----	----	----	1	----	----	1	----	----	----	----	1	----	----	----	----	1	1	1	----
Hartland	613	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	----	----
Manchester	12,504	----	3	1	4	3	3	----	----	8	2	1	2	1	2	4	3	9	4	2	1	1	1	----	----	2
Marlborough	120	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
New Britain	35,560	10	9	5	6	7	6	4	6	5	2	9	4	2	5	12	14	6	10	15	10	15	8	7	4	5
Newington	1,110	----	1	----	1	----	----	----	----	----	----	----	----	----	----	1	----	----	----	----	----	----	----	----	----	----
Plainville	2,345	----	1	----	----	----	1	----	----	----	----	----	----	----	----	3	----	----	----	----	----	2	----	1	3	----
Rocky Hill	992	----	----	----	----	----	----	----	----	----	1	----	----	1	----	----	----	----	----	1	----	----	----	1	4	2
Simsbury	2,270	----	----	1	1	1	1	----	----	----	1	1	1	----	2	3	----	----	----	1	----	1	----	2	1	1
Southington	6,200	2	3	----	----	1	1	2	2	5	3	----	----	1	1	1	2	----	4	2	1	3	1	----	3	----
South Windsor	2,236	1	----	----	----	----	----	----	1	----	1	----	----	----	1	----	----	2	----	----	1	2	----	1	1	----
Suffield	3,800	----	----	1	1	----	----	----	----	1	----	----	----	1	----	1	1	2	----	----	2	2	1	1	3	1
West Hartford	4,190	1	----	----	----	----	----	1	----	----	----	2	1	1	----	----	4	1	1	----	----	----	----	1	2	----
Wethersfield	2,930	----	----	----	----	1	----	1	1	----	----	1	----	----	1	----	1	----	1	----	----	5	2	----	----	----
Windsor	4,142	1	----	1	----	----	----	----	----	1	2	----	----	2	2	1	1	3	4	----	3	2	----	1	1	1
Windsor Locks	3,305	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2	3	----	1	----	3	1	----	----	----	2

TABLE XIV—CONTINUED. NEW HAVEN COUNTY.

TOWNS.	Estimated Population.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.
New Haven	125,620	44	37	65	51	31	42	43	107	28	30	36	25	28	32	28	28	26	18	24	24	38	24	25	17	42
Ansonia	14,550	1	3	----	5	1	5	1	2	3	1	3	----	1	6	2	3	8	12	1	2	----	----	----	----	----
Beacon Falls	720	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Bethany	491	----	----	----	----	----	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	1
Branford	6,700	----	4	2	----	----	1	1	----	2	2	----	2	2	----	4	1	1	5	4	1	1	----	1	----	2
Cheshire	2,040	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1	1	1	2	1	----	----	1	----	----
Derby	9,500	2	----	1	3	4	1	----	3	1	1	1	2	2	3	----	2	1	----	4	1	7	7	4	4	7
East Haven	1,336	----	----	----	----	----	----	----	----	----	----	----	----	1	----	1	----	----	----	----	----	----	----	----	----	----
Guilford	2,790	1	1	1	1	----	----	----	----	1	----	----	----	----	1	1	1	----	1	----	----	4	----	----	1	----
Hamden	5,220	1	1	3	2	1	1	1	1	1	1	1	----	1	2	----	2	3	----	----	1	3	1	1	----	----
Madison	1,590	----	1	1	----	1	----	----	----	----	----	1	2	----	----	----	----	----	----	----	----	11	1	1	3	2
Meriden	31,315	5	7	6	3	2	10	2	5	7	2	7	1	2	2	6	8	6	8	13	7	----	5	6	9	9
Middlebury	872	----	----	----	----	----	----	----	----	----	----	1	----	----	----	1	----	----	----	----	----	----	----	----	----	----
Milford	3,760	----	1	1	----	1	1	1	2	----	----	2	----	----	----	----	----	1	----	1	1	2	----	1	----	1
Naugatuck	14,000	1	1	1	1	2	2	5	1	4	5	----	1	3	4	3	2	1	3	4	5	8	----	1	4	1
North Branford	806	----	----	----	----	----	----	----	1	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----
North Haven	2,405	----	----	2	----	1	----	1	1	3	----	----	----	----	----	----	----	----	----	----	1	----	1	1	----	1
Orange	8,960	4	3	3	3	1	----	6	1	3	1	1	----	----	2	----	2	5	2	1	1	2	----	3	----	----
Oxford	1,000	----	----	----	----	----	----	----	----	----	----	----	1	----	1	----	3	----	----	----	1	----	----	1	----	----
Prospect	655	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	----	----	----	----	2	----	----
Seymour	3,733	----	2	1	1	----	----	----	----	1	----	----	1	----	1	----	----	1	----	3	2	3	----	----	----	----
Southbury	1,357	----	1	----	----	----	----	----	1	----	----	1	----	----	----	----	----	----	----	1	----	----	----	----	----	----
Wallingford	10,935	----	1	----	1	2	1	----	----	5	2	2	1	2	----	3	7	1	5	2	2	2	1	1	4	5
Waterbury	65,490	12	16	16	19	13	17	19	17	24	15	13	13	19	18	16	14	29	22	43	11	13	8	19	13	20
Wolcott	628	----	----	----	----	----	----	1	----	----	----	----	----	----	----	----	----	1	----	----	1	1	1	2	----	----
Woodbridge	800	----	----	1	----	----	----	----	----	----	----	----	----	----	----	1	1	----	----	----	----	----	----	----	----	----

TABLE XIV—CONTINUED. NEW LONDON COUNTY.

TOWNS.	Estimated Population.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.
New London	20,580	2	6	4	6	1	3	7	2	3	4	4	4	3	....	4	4	9	4	7	6	3	3	1	1	....
Bozrah	635	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	1	3	....	2	....	....	....	....	....
Colchester	1,200	....	....	....	....	1	....	....	....	....	....	1	....	....	....	1	....	....	....	2	1	3	1	....	....	1
East Lyme	1,670	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	1	1	5	....	1	1	....	....	2	1
Franklin	515	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	1	....	....	....	....	....
Griswold	3,800	....	....	1	....	....	....	1	1	....	....	....	1	2	1	1	....	....	1	....	1	1	....	1	1	1
Groton	6,300	2	2	....	3	....	1	....	....	1	3	1	....	2	....	....	....	4	2	....	1	2	1	1	....	....
Lebanon	1,402	....	....	....	1	....	....	....	....	1	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....
Ledyard	1,278	....	....	....	....	....	....	....	....	1	1	1	....	1	....	1	....	2	1	2	1	....	....	1	....	1
Lisbon	816	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Lyme	570	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Montville	2,435	1	....	....	2	....	....	....	....	....	....	....	....	....	....	2	....	3	....	1	....	1	....	1	....	....
Norwich	25,910	5	3	4	2	2	4	4	3	7	1	3	3	8	5	10	5	4	3	5	8	1	3	5	13	12
North Stonington	1,062	....	....	....	....	....	....	1	1	....	....	....	....	1	....	....	....	....	....	1	1	....	....	1	....	1
Old Lyme	1,070	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	....	1	....	1	....	....	1
Preston	3,008	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	2
Salem	460	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sprague	1,525	....	....	....	....	....	2	1	....	....	....	1	....	....	....	....	1	....	....	....	....	....	1	1	....	1
Stonington	9,630	....	....	1	....	3	4	....	....	3	2	2	1	3	....	3	4	8	2	2	....	3	2	1	....	1
Voluntown	722	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	2	....	1	....	....	1	....	1	1	1
Waterford	3,100	....	1	1	1	....	....	....	....	....	2	1	....	1	1	1	....	1	....	4	2	....	1	1	....	....

TABLE XIV—Continued. Fairfield County.

TOWNS.	Estimated Population.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.
Danbury	19,475	3	8	2	6	1	9	3	5	4	2	3	3	9	10	1	9	16	12	8	22	8	7	10	1	4
Bridgeport	88,700	16	12	10	9	14	11	18	18	10	8	8	14	11	6	2	12	7	8	3	8	8	17	....	12	11
Bethel	3,270	....	....	....	....	....	....	....	1	1	....	....	1	2	1	5	4	3	4	2	1	2	....	3	1	....
Brookfield	1,090	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	2	....	1	....	....	....	....
Darien	3,790	....	1	....	....	....	....	....	....	1	1	....	....	1	1	....	....	....	2	....	....	....	....	....	....	....
Easton	928	....	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....
Fairfield	5,000	....	....	....	1	1	....	3	....	1	....	....	....	....	....	....	1	....	....	....	....	....	....	2	2	1
Greenwich	13,800	....	1	2	5	2	5	3	1	2	2	3	2	....	5	....	2	3	....	5	3	4	1	2	4	1
Huntington	6,830	....	1	1	1	1	1	....	1	2	3	....	....	1	2	1	5	1	1	2	2	1	1	2	1	....
Monroe	1,082	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
New Canaan	3,180	....	....	....	1	....	....	....	2	2	....	....	1	1	1	1	....	....	....	2	1	....	....	....	....	2
New Fairfield	516	1	....	1	1	....	....	....	....	....	....	1	....	1	....	....	....	1	2	1	....	....	....	....	....	1
Newtown	3,066	....	....	1	....	....	....	....	....	1	....	....	....	....	1	2	....	....	....	....	2	....	....	....	1	....
Norwalk	21,680	10	10	6	5	5	6	11	11	9	3	1	3	....	4	2	4	6	9	9	4	2	2	2	3	2
Redding	1,330	....	....	....	....	....	1	....	....	1	2	1	....	....	....	1	....	....	1	....	2	....	....	1	....	2
Ridgefield	2,938	1	3	2	1	1	1	....	....	2	1	....	1	....	1	....	....	2	2	....	....	....	1	....	....	1
Sherman	650	....	....	....	....	....	....	....	....	....	....	....	....	1	....	2	1	....	....	1	1	....	....	....	....	....
Stamford	21,350	3	6	3	6	5	10	13	3	5	1	4	2	5	36	1	3	5	5	5	8	1	2	2	3	....
Stratford	4,500	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	2	2	3	3	1	1
Trumbull	1,700	....	....	....	....	....	....	1	1	....	1	....	....	....	1	1	....	....	....	....	1	....	....	....	....	....
Weston	894	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	1	....	....	1
Westport	4,260	....	1	....	5	3	....	....	1	1	1	....	....	....	2	1	1	....	2	1	9	....	1	2	....	1
Wilton	1,500	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1	2	1	1	1	1	2

TABLE XIV—CONTINUED. WINDHAM COUNTY.

TOWNS.	Estimated Population.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.
Brooklyn	2,142	....	....	1	....	....	....	....	1	4	....	....	1	....	1	3	....	....	4	....	1	2	1	1	1	2
Ashford	741	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	....	....	....	1	....	3	....	....	....
Canterbury	820	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	1	....
Chaplin	520	....	....	....	....	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....
Eastford	493	....	....	1	....	2	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Hampton	627	....	....	....	2	....	....	....	....	....	....	....	....	....	....	1	2	....	....	....	1	....	1	....	....	....
Killingly	6,682	1	1	....	1	1	1	3	1	2	2	....	....	2	1	3	2	2	4	2	4	8	4	17	6	6
Plainfield	5,010	....	1	2	....	....	2	....	1	1	1	1	1	2	....	1	3	....	2	2	1	5	....	1	1	3
Pomfret	2,120	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	2	....	1	....	1	....	1	....
Putnam	8,016	3	....	....	2	1	....	....	....	5	1	1	3	6	4	6	3	2	3	....	2	4	4	4	....	6
Scotland	443	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	1	....	....	....	....
Sterling	1,335	1	....	....	....	1	....	....	....	....	....	1	....	....	....	....	1	2	1	2	3	....	1	....	....	....
Thompson	7,130	1	....	1	....	3	1	....	....	....	....	1	1	1	2	1	3	2	7	....	4	3	1	....	....	1
Windham	10,220	2	1	2	3	2	3	1	2	3	....	2	1	6	1	2	3	3	2	8	1	5	2	6	8	7
Woodstock	1,924	1	....	2	1	....	....	....	1	1	1	....	....	1	2	....	....	2	1	1	....	....	....	....	....	....

TABLE XIV—CONTINUED. LITCHFIELD COUNTY.

TOWNS.	Estimated Population.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.
Litchfield	3,142	....	....	1	....	1	....	....	....	....	....	2	....	1	3	....	....	....	....	....	....	....	....	1	1	....
Barkhamsted	652	1	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....	1	....	....	....
Bethlehem	602	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	1	....	1
Bridgewater	674	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	1	1
Canaan	700	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	....	....	1	....	....	....	....	....
Colebrook	353	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	1	....	....	1	2	....	....
Cornwall	1,089	....	....	1	....	....	....	....	....	1	....	....	....	....	2	....	1	....	....	....	1	....	....	....	2	....
Goshen	726	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....
Harwinton	1,429	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	1	....	....	2	....	1
Kent	1,090	....	....	1	....	....	....	1	....	1	1	....	....	....	....	....	1	1	....	....	....	....	....	....	1	....
Morris	496	1	....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1
New Hartford	3,635	....	....	....	....	....	....	....	1	....	1	2	....	1	1	3	1	....	1	6	1	4	2	2	1	2
New Milford	5,513	1	....	1	....	2	....	....	1	1	1	....	....	....	2	1	....	2	1	2	2	3	1	3	2	1
Norfolk	1,668	....	....	....	1	....	....	....	....	1	....	....	....	1	....	....	1	....	....	....	1	1	....	....	1	....
North Canaan	1,899	....	1	1	1	....	....	....	....	....	....	....	....	....	....	1	1	3	1	2	4	3	....	1	....	....
Plymouth	3,372	2	....	....	1	1	....	1	1	3	....	1	....	....	....	....	5	....	....	....	1	....	1	1	1	1
Roxbury	1,207	....	....	....	....	1	....	....	1	1	1	....	....	....	....	1	1	....	1	3	....	1	....	....	....	1
Salisbury	3,544	....	....	1	2	....	....	....	1	....	1	....	....	1	1	....	1	1	....	....	1	....	....	....	....	1
Sharon	1,849	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	2	....	....	....	2	....
Thomaston	3,317	1	....	....	....	....	1	....	2	....	2	....	1	2	1	1	1	1	4	....	1	4	....	....	....	....
Torrington	17,580	1	5	2	3	1	2	....	1	2	4	3	....	3	3	1	....	1	3	1	3	1	6	....	1	....
Warren	396	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1	2	....	1	....	....
Washington	1,969	1	1	1	....	....	1	....	....	1	....	....	....	....	....	1	....	1	....	1	....	1	1	2	3	....
Watertown	3,721	1	....	....	2	....	1	1	....	2	....	1	1	2	2	3	5	....	1	2	....	1	....	1	1	1
Winchester	9,030	4	1	2	2	2	1	2	1	1	1	....	3	3	3	3	2	....	1	....	....	....	1	2	2	....
Woodbury	2,126	....	....	1	....	....	....	1	....	....	....	....	....	1	....	....	1	....	1	2	1	....	....	1	....	....

TABLE XIV—CONTINUED. MIDDLESEX COUNTY.

TOWNS.	Estimated Population.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.
Middletown	19,310	5	4	5	....	2	5	1	6	2	3	3	2	5	2	4	9	4	5	21	....	4	1	1	....	6
Haddam	1,951	....	....	1	....	1	....	1	....	....	....	1	1	....	2	....	1	3	1	....	1	3	4	1	....	....
Chatham	2,528	....	1	1	....	1	....	....	....	....	....	....	....	1	....	....	....	1	1	3	....	....	....	3	2	1
Chester	1,349	....	1	1	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	1
Clinton	1,465	....	....	....	1	1	....	....	....	....	....	....	2	....	....	....	....	1	2	1	....	1	....	1	1	....
Cromwell	2,066	....	1	....	1	....	1	1	....	1	....	....	....	1	....	2	2	3	2	4	1	....	1	2	....	1
Durham	906	....	1	....	....	....	1	....	1	....	....	....	....	....	....	2	....	1	1	1	1	1	1	1	2	1
East Haddam	2,394	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	1
Essex	2,926	....	1	....	....	....	....	....	....	....	1	....	....	....	....	....	1	1	1	....	....	....	....	....	1	1
Killingworth	706	....	....	....	....	1	....	1	....	....	....	....	....	....	....	....	1	1	1	....	....	....	....	....	....	....
Middlefield	720	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	1	....	....	....	....
Old Saybrook	1,389	....	....	....	....	....	....	1	....	....	....	1	....	1	....	2	....	1	3	....	....	....	....	....	1	....
Portland	3,192	....	....	1	....	....	....	....	1	4	....	1	....	....	1	3	....	2	2	1	2	5	5	4	1	3
Saybrook	1,754	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	3	....	....	....	....	....	....	....
Westbrook	892	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	1	....	....	....	....	....	....	1

TABLE XIV—CONTINUED. TOLLAND COUNTY.

TOWNS.	Estimated Population.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.	1898.	1897.	1896.	1895.	1894.	1893.	1892.	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.
Tolland	1,036									1					1	1			1		1		2		1	
Andover	373																2				2					1
Bolton	461	1						1														1				1
Columbia	587				1															1						
Coventry	1,438												1			1					2		1	1		2
Ellington	2,061	1				1		2								1			1			1		1		
Hebron	998						1		1		1			1					1	1		1		1		
Mansfield	1,761	1						1	2	1					1	2						1	1	1	2	2
Somers	1,741				3				1			2					1	1		1		1				
Stafford	4,107	2			1	3	1	3		1	2	2	2	2	1	2	2	2	2	7	4	1	2		1	7
Union	426																		1					6	1	
Vernon	8,230		1	2	2	2		1	1	1		1	3		1	1	2	6	5		5	3	7		2	3
Willington	869		1																		2	2	1	2		

BIRTHS, 1908.

There were registered during the year 1908, in the State of Connecticut, 26,694 living births and 1,124 still-births. The latter are not counted in the enumeration of births.

As compared with the year before, there were 749 more living births and 10 more still-births reported.

Of the whole number of births of which the sex was certified, 13,656 were males, 12,977 were females, while in regard to 61 the sex was not stated.

Of the sexes registered, the proportion of boys to girls was 105.2 to 100, against 105.3 the previous year.

New Haven County had the largest birth-rate, viz.: 27.9, and foreign-born parents, to wit, 60.6 per cent.

Litchfield County had the lowest birth-rate, 22.0 per cent.

Of Hartford County, 54.9 per cent. were of foreign-born parents.

Of New London County, 48.3 per cent. were of foreign-born parents.

Of Fairfield County, 50.8 per cent. were of foreign-born parents.

Of Windham County, 34.4 per cent. were of foreign-born parents.

Of Litchfield County, 44.7 per cent. were of foreign-born parents.

Of Middlesex County, 51.7 per cent. were of foreign-born parents.

Of Tolland County, 43.6 per cent. were of foreign-born parents.

Of the State, 52.9 per cent. were registered as both parents foreign-born and 33.4 per cent. of native parents; there were 12.3 per cent. of one native and one foreign-born parent, while of 1.2 per cent. the nationality of parents was not stated.

The proportion of births to the whole estimated population of the State (viz., 1,038,240) was 1 to 38.9 of the population, or 25.7 per thousand.

The town having the highest birth-rate is in New Haven County, namely Beacon Falls, 48.6.

The largest number of births in any one month occurred in March, 2,411; the smallest in November, 2,062.

The largest number of males were born in March, 1,231; the largest number of females were born in March, 1,171.

In the first quarter of the year the birth-rate was 26.6.

In the second quarter of the year the birth-rate was 25.3.

In the third quarter of the year the birth-rate was 26.2.

In the fourth quarter of the year the birth-rate was 24.6.

In Hartford County the town having the highest birth-rate was Enfield, 44.7. Bloomfield had the lowest birth-rate, 11.3.

In New Haven County the town having the highest birth-rate was Beacon Falls, 48.6. Prospect had the lowest, 9.1.

In New London County, Colchester had the highest birth-rate, 40.8, and Preston the lowest, 3.9.

In Fairfield County the town having the highest birth-rate was Stamford, 43.0. Monroe had the lowest, 10.1.

In Windham County, the highest birth-rate was in Sterling, 29.9; the lowest in Canterbury, 12.1.

Litchfield County's highest was Plymouth, 46.8, and the lowest was New Hartford, 10.4.

In Middlesex County, Middlefield took the lead, 41.6; and Chatham was the lowest, 11.8.

In Tolland County, Stafford, 32.6, Andover, 8.0.

The registered number of still-births in the State was 1,124, which is one to every 23.7 of living births.

There were 641 males, 405 females; not stated, 53; 18 males, 7 females, were colored.

TABLE XV.—SHOWING AMERICAN AND FOREIGN PARENTAGE OF BIRTHS BY COUNTIES, 1908.

COUNTIES.	PARENTS.				Nativity of Parents not stated.	Total.
	Both American.	Both Foreign.	Father For., Mother Am.	Father Am., Mother For.		
Hartford	1,961	3,273	335	347	35	5,951
New Haven	2,473	5,276	590	497	31	8,867
New London	821	861	150	144	11	1,987
Fairfield	1,926	2,857	341	260	238	5,622
Windham	459	377	133	117	7	1,093
Litchfield	675	710	97	95	8	1,585
Middlesex	371	524	60	55	2	1,012
Tolland	238	252	52	31	4	577
Total	8,924	14,130	1,758	1,546	336	26,694

TABLE XVI.—SHOWING NATIVITY OF PARENTAGE AND PERCENTAGE, 1908.

Years.	American Parents.	Per cent.	Foreign Parents.	Per cent.	Foreign American.	Per cent.	Not stated.	Per cent.	Total Births.
1908	8,924	33.4	14,130	52.9	3,304	12.3	336	1.2	26,694
1907	8,416	32.4	14,047	54.1	2,774	10.6	708	2.7	25,945
1906	8,388	34.0	13,116	53.2	2,801	11.3	336	1.3	24,641
1905	8,328	35.7	11,327	48.6	3,264	14.0	352	1.5	23,271
1904	8,599	37.1	10,623	46.4	3,319	14.5	323	1.4	22,864
1903	8,236	37.8	9,964	45.8	3,276	15.0	275	1.2	21,751
1902	8,283	39.0	9,443	44.5	3,133	14.7	357	1.6	21,216
1901	7,836	38.6	8,925	43.9	3,186	15.6	347	1.7	20,294
1900	8,148	39.6	8,886	43.2	3,247	15.7	279	1.3	20,560
1899	8,299	39.7	8,970	43.0	3,290	15.7	296	1.4	20,855
1898	8,496	40.4	8,781	41.7	3,395	16.1	351	1.6	21,023

TABLE XVII.—Illegitimate Births by Months and Sex, 1908.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
White:													
Males.....	8	13	3	4	7	11	8	11	5	6	10	9	95
Females...	7	5	5	4	5	8	3	3	6	6	3	6	61
Sex not stated	....	....	....	....	....	....	....	....	....	1	....	....	1
Colored:													
Males.....	1	1	....	1	....	2	....	1	....	1	1	....	8
Females...	*2	1	3	*2	1	....	1	1	....	....	....	....	11
Total.....	18	20	11	11	13	21	12	16	11	14	14	15	176

* Includes one mixed.

TABLE XVIII.—Twin Births by Months and Sex, 1908.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
White:													
Males.....	27	23	24	23	16	11	29	30	32	18	18	32	283
Females...	21	23	16	28	16	19	17	28	22	18	19	24	251
Sex not stated	....	....	....	....	....	....	....	....	....	....	1	....	1
Colored:													
Males.....	....	....	....	....	....	....	....	....	....	....	....	....	....
Females...	....	....	....	2	....	....	....	2	....	....	....	....	4
Total.....	48	46	40	*53	32	30	46	60	54	36	38	56	539

* Includes one set of triplets.

TABLE XIX.—PLURALITY BIRTHS, 1908. BY TOWNS.

(Included in Tables I, II, III, IV.)

HARTFORD COUNTY.

TOWNS.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Hartford	Males	--	3	1	--	5	1	--	3	--	--	2	5	20
	Females	--	3	1	2	5	3	2	7	--	--	--	5	28
Berlin	Males	2	--	--	--	--	--	2	--	--	--	--	--	4
	Females	--	--	--	--	--	--	--	--	--	--	--	--	----
Bristol	Males	--	--	--	--	--	--	--	--	--	--	--	--	----
	Females	--	2	--	--	--	--	--	--	--	--	--	--	2
Canton	Males	--	--	--	--	--	--	--	--	--	--	--	--	----
	Females	--	--	--	--	--	--	--	--	--	--	2	--	2
East Hartford	Males	--	--	--	--	1	--	--	--	--	--	--	--	1
	Females	--	--	--	2	1	--	--	--	--	--	--	--	3
East Windsor	Males	--	--	--	2	--	--	--	--	--	--	--	--	2
	Females	--	--	--	1	--	--	--	--	--	--	--	--	1
Enfield	Males	--	--	--	--	--	--	2	--	1	--	--	--	3
	Females	--	--	--	--	--	2	--	--	1	--	--	--	3
Farmington	Males	--	--	--	--	--	--	--	--	--	--	--	--	----
	Females	--	--	--	--	--	--	--	--	--	--	--	2	2
Glastonbury	Males	--	--	--	--	--	--	--	--	--	--	--	--	----
	Females	--	--	--	--	--	2	--	--	--	--	--	--	2
Manchester	Males	--	--	2	--	--	1	--	2	2	1	--	--	8
	Females	2	--	--	--	--	1	--	2	--	1	--	2	8
New Britain	Males	--	1	--	--	--	--	--	--	--	--	4	--	5
	Females	--	1	--	--	--	2	--	--	2	--	2	--	7
Windsor	Males	--	--	--	--	--	--	--	1	--	--	1	--	2
	Females	--	--	--	--	--	--	--	1	--	--	1	--	2
Total		4	10	4	7	12	12	6	16	6	2	12	14	105

TABLE XIX.—CONTINUED. NEW HAVEN COUNTY—1908.

TOWNS.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
New Haven	Males	4	4	9	2	3	1	10	3	2	5	--	7	50
	Females	4	2	1	4	1	3	2	7	4	5	2	5	40
Ansonia	Males	--	--	--	--	--	--	--	2	--	--	1	--	3
	Females	--	--	2	--	--	--	--	--	--	--	1	--	3
Branford	Males	2	2	--	--	--	--	--	--	--	--	--	--	4
	Females	--	--	--	--	--	--	--	--	--	--	2	--	2
Cheshire	Males	--	--	--	--	--	--	--	1	--	--	--	--	1
	Females	--	--	--	--	--	--	--	1	--	--	--	--	1
Derby	Males	1	--	--	2	--	--	--	--	--	1	2	--	6
	Females	1	--	--	--	--	--	--	--	2	1	--	--	4
Hamden	Males	--	--	--	--	--	--	--	1	--	--	--	--	1
	Females	--	--	--	--	--	--	--	1	--	--	--	--	1
Meriden	Males	--	--	--	--	--	1	--	--	2	--	--	--	3
	Females	--	--	--	2	--	1	--	--	--	--	--	--	3
Milford	Males	--	--	--	--	--	--	--	--	1	--	--	--	1
	Females	--	--	--	--	--	--	--	--	1	--	--	--	1
Naugatuck	Males	--	--	--	--	--	--	2	--	--	--	--	--	2
	Females	--	--	--	--	--	--	--	--	--	--	--	--	----
Seymour	Males	--	--	--	--	--	--	--	--	--	--	--	1	1
	Females	--	--	2	--	--	--	--	--	--	--	--	1	3
Wallingford	Males	4	--	--	--	--	--	--	--	--	--	--	1	5
	Females	--	--	--	--	--	--	--	--	2	--	--	1	3
Waterbury	Males	4	4	2	3	--	1	2	6	8	3	--	2	35
	Females	--	2	2	3	--	1	2	2	2	3	--	2	19
Wolcott	Males	--	--	--	--	--	--	--	1	--	--	--	--	1
	Females	--	--	--	--	--	--	--	1	--	--	--	--	1
Total		20	14	18	16	4	8	18	26	24	18	8	20	194

TABLE XIX.—CONTINUED. NEW LONDON COUNTY—1908.

TOWNS.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
New London	Males	--	--	1	--	--	1	--	--	--	1	--	3	6
	Females	--	--	1	--	--	1	--	--	--	1	--	1	4
Colchester	Males	--	--	--	--	--	--	1	--	--	--	--	--	1
	Females	--	--	--	--	--	--	1	--	--	--	--	--	1
East Lyme	Males	--	--	2	--	--	--	--	--	--	--	--	--	2
	Females	--	--	--	--	--	--	--	--	--	--	--	--	....
Griswold	Males	--	--	--	--	--	--	--	--	1	--	--	--	1
	Females	--	--	--	--	--	--	--	--	1	--	--	--	1
Groton	Males	--	--	--	--	--	--	--	--	2	--	--	--	2
	Females	--	2	--	--	--	--	--	--	--	--	--	--	2
Norwich	Males	--	--	1	1	1	--	--	--	2	--	--	4	9
	Females	--	2	1	1	1	--	--	2	--	2	--	--	9
Old Lyme	Males	--	--	--	--	--	--	--	--	--	--	1	--	1
	Females	--	--	--	--	--	--	--	--	--	--	1	--	1
Sprague	Males	--	--	--	--	--	1	--	--	--	--	--	--	1
	Females	--	--	--	--	--	1	--	--	--	--	--	--	1
Stonington	Males	1	--	--	--	--	--	--	--	--	2	--	--	3
	Females	1	--	--	--	--	--	--	--	--	--	--	--	1
Voluntown	Males	1	--	--	--	--	--	--	--	--	--	--	--	1
	Females	1	--	--	--	--	--	--	--	--	--	--	--	1
Total		4	4	6	2	2	4	2	2	6	6	2	8	48

TABLE XIX.—CONTINUED. FAIRFIELD COUNTY—1908.

TOWNS.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Bridgeport	Males	1	2	2	1	2	2	1	2	3	3	3	3	25
	Females	1	2	2	3	4	2	3	--	1	1	1	1	21
Bethel	Males	--	--	--	--	--	--	--	--	--	--	--	--	----
	Females	--	--	--	2	--	--	--	--	--	--	--	--	2
Danbury	Males	2	--	--	--	--	--	2	--	1	--	--	--	5
	Females	--	--	--	2	--	--	--	--	1	--	--	--	3
Darien	Males	--	--	--	--	--	--	2	--	--	--	--	--	2
	Females	--	--	--	--	--	--	--	--	--	--	--	--	----
Greenwich	Males	--	--	--	4	--	--	--	--	2	--	--	--	6
	Females	--	--	--	--	--	--	--	--	--	2	--	--	2
Huntington	Males	--	--	1	--	--	--	--	--	--	--	--	--	1
	Females	2	--	1	--	--	--	--	--	--	--	--	--	3
Newtown	Males	--	--	--	--	--	--	--	--	--	--	--	--	----
	Females	--	--	--	--	--	--	2	--	--	--	--	--	2
Norwalk	Males	--	--	--	--	--	--	--	1	--	--	4	1	6
	Females	--	--	--	--	--	--	--	1	--	--	--	1	2
Ridgefield	Males	1	--	--	--	--	--	--	--	--	--	--	--	1
	Females	1	--	--	--	--	--	--	--	--	--	--	--	1
Stratford	Males	--	--	--	2	--	--	--	--	--	--	--	--	2
	Females	--	--	--	--	--	--	2	--	--	--	--	--	2
Stamford	Males	4	1	2	--	--	--	--	1	--	--	--	1	9
	Females	4	1	--	--	--	--	--	1	--	--	--	1	7
Total		16	6	8	14	6	4	12	6	8	6	8	8	102

WINDHAM COUNTY—1908.

TOWNS.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Windham	Males	--	1	--	2	--	--	2	--	--	--	1	--	6
	Females	--	1	--	2	--	--	--	--	--	--	1	--	4
Brooklyn	Males	--	--	--	1	2	--	--	--	--	--	--	--	3
	Females	--	--	--	1	--	--	--	--	--	--	--	--	1
Killingly	Males	--	--	--	--	--	--	--	--	--	--	--	--	----
	Females	--	--	--	--	2	--	--	--	--	--	--	--	2
Pomfret	Males	--	--	--	--	--	--	--	--	--	--	--	--	----
	Females	--	--	--	--	--	--	--	--	--	2	--	--	2
Putnam	Males	--	2	--	--	2	--	--	--	--	--	1	--	5
	Females	--	2	--	--	--	--	--	--	--	--	--	--	2
	Sex not stated	--	--	--	--	--	--	--	--	--	--	1	--	1
Thompson	Males	--	--	--	--	--	--	--	--	--	--	--	--	----
	Females	--	--	--	--	--	--	--	--	--	--	--	2	2
Woodstock	Males	--	--	--	--	--	--	--	--	--	--	--	--	----
	Females	2	--	--	--	--	--	--	--	--	--	--	--	2
Total		2	6	--	6	6	--	2	--	--	2	4	2	30

TABLE XIX.—CONTINUED. LITCHFIELD COUNTY—1908.

TOWNS.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Cornwall	Males	--	--	--	--	--	--	--	--	--	--	--	--	----
	Females	--	--	--	--	--	--	--	--	2	--	--	--	2
Harwinton	Males	--	--	--	1	--	--	--	--	--	--	--	--	1
	Females	--	--	--	1	--	--	--	--	--	--	--	--	1
New Milford	Males	--	2	--	--	--	--	--	--	--	--	--	--	2
	Females	--	--	--	2	--	--	--	2	--	--	--	--	4
North Canaan	Males	--	--	--	--	--	--	--	2	--	--	--	--	2
	Females	--	--	--	--	--	--	--	--	--	--	--	--	----
Sharon	Males	--	--	--	--	--	--	2	--	2	--	--	--	4
	Females	--	--	--	--	--	--	--	--	--	--	--	--	----
Torrington	Males	--	--	1	2	--	2	1	--	--	--	--	2	8
	Females	--	--	3	--	--	--	1	--	--	--	--	--	4
Woodbury	Males	--	--	--	--	--	--	--	--	--	--	--	--	----
	Females	--	2	--	--	--	--	--	--	--	--	--	--	2
Total		--	4	4	6	--	2	4	4	4	--	--	2	30

MIDDLESEX COUNTY—1908.

TOWNS.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Middletown	Males	--	--	--	--	--	--	--	2	2	--	1	--	5
	Females	--	--	--	2	2	--	--	--	2	--	1	--	7
Essex	Males	--	--	--	--	--	--	--	1	--	--	--	--	1
	Females	--	--	--	--	--	--	--	1	--	--	--	--	1
Haddam	Males	--	--	--	--	--	--	--	--	1	--	--	--	1
	Females	--	--	--	--	--	--	--	--	1	--	--	--	1
Portland	Males	--	--	--	--	--	--	--	1	--	--	--	--	1
	Females	--	--	--	--	--	--	--	1	--	--	--	--	1
Saybrook	Males	--	--	--	--	--	--	--	--	--	--	--	2	2
	Females	2	--	--	--	--	--	--	--	--	--	--	--	2
Total		2	--	--	2	2	--	--	6	6	--	2	2	22

TOLLAND COUNTY—1908.

TOWNS.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Ellington	Males	--	--	--	--	--	--	--	--	--	--	1	--	1
	Females	--	--	--	--	--	--	--	--	--	--	1	--	1
Stafford	Males	--	1	--	--	--	--	--	--	--	2	--	--	3
	Females	--	1	--	--	--	--	--	--	--	--	--	--	1
Vernon	Males	--	--	--	--	--	--	--	--	--	--	--	--	----
	Females	--	--	--	--	--	--	2	--	--	--	--	--	2
Total		--	2	--	--	--	--	2	--	--	2	2	--	8

TABLE XX.—PLURALITY BIRTHS, 1908, BY COUNTIES.

(Included in Tables I, II, III, IV.)

COUNTIES.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	TOTAL.
Hartford	Males	2	4	3	2	6	2	4	6	3	1	7	5	45
	Females	2	6	1	5	6	10	2	10	3	1	5	9	60
	Total	4	10	4	7	12	12	6	16	6	2	12	14	105
New Haven	Males	15	10	11	7	3	3	14	14	13	9	3	11	113
	Females	5	4	7	9	1	5	4	12	11	9	5	9	81
	Total	20	14	18	16	4	8	18	26	24	18	8	20	194
New London	Males	2	--	4	1	1	2	1	--	5	3	1	7	27
	Females	2	4	2	1	1	2	1	2	1	3	1	1	21
	Total	4	4	6	2	2	4	2	2	6	6	2	8	48
Fairfield	Males	8	3	5	7	2	2	5	4	6	3	3	5	53
	Females	8	3	3	7	4	2	7	2	2	3	5	3	49
	Total	16	6	8	14	6	4	12	6	8	6	8	8	102
Windham	Males	--	3	--	3	4	--	2	--	--	--	2	--	14
	Females	2	3	--	3	2	--	--	--	--	2	1	2	15
	Sex not stated	--	--	--	--	--	--	--	--	--	--	1	--	1
	Total	2	6	--	6	6	--	2	--	--	2	4	2	30
Litchfield	Males	--	2	1	3	--	2	3	2	2	--	--	2	17
	Females	--	2	3	3	--	--	1	2	2	--	--	--	13
	Total	--	4	4	6	--	2	4	4	4	--	--	2	30
Middlesex	Males	--	--	--	--	--	--	--	4	3	--	1	2	10
	Females	2	--	--	2	2	--	--	2	3	--	1	--	12
	Total	2	--	--	2	2	--	--	6	6	--	2	2	22
Tolland	Males	--	1	--	--	--	--	--	--	--	2	1	--	4
	Females	--	1	--	--	--	--	2	--	--	--	1	--	4
	Total	--	2	--	--	--	--	2	--	--	2	2	--	8
	Grand Total	48	46	40	53	32	30	46	60	54	36	38	56	539

TABLE XXI.—TWINS AND ILLEGITIMATE BIRTHS BY COUNTIES FOR THE PAST TEN YEARS, WITH SEXES FOR 1908.

COUNTIES.	1908.								1907.		1906.		1905.		1904.		1903.		1902.		1901.		1900.		1899.		TOTAL FOR 10 YEARS.		AVERAGE FOR 10 YEARS.	
	TWINS.				ILLEGIT.																									
	Males.	Females.	Sex not stated	Total.	Males.	Females.	Sex not stated	Total.	Twins.	Illegitimate.	Twins.	Illegitimate.	Twins.	Illegitimate.	Twins.	Illegitimate.	Twins.	Illegitimate.	Twins.	Illegitimate.	Twins.	Illegitimate.	Twins.	Illegitimate.	Twins.	Illegitimate.	Twins.	Illegitimate.	Twins.	Illegitimate.
Hartford	45	60	..	*105	30	19	1	50	126	34	94	35	118	60	120	47	110	66	†110	55	102	72	93	38	*81	53	1058	510	105.8	51.0
New Haven ..	113	81	..	194	31	17	..	48	156	44	*177	19	*159	79	*217	80	*179	58	*187	81	†202	68	*167	88	*145	73	1783	638	178.3	63.8
New London..	27	21	..	48	5	4	..	9	58	20	36	6	50	15	38	18	60	14	*35	21	38	14	*51	16	38	13	452	146	45.2	14.6
Fairfield......	53	49	..	102	12	19	..	31	126	31	*75	19	92	45	†76	46	96	40	100	54	†118	47	*87	35	*77	30	949	378	94.9	37.8
Windham	14	15	1	30	7	5	..	12	22	4	*25	10	16	14	26	9	18	8	16	11	*33	10	16	4	24	10	226	92	22.6	9.2
Litchfield.....	17	13	..	30	8	4	..	12	46	8	30	12	32	15	36	15	†34	16	30	16	†50	10	32	16	26	16	346	186	34.6	13 6
Middlesex	10	12	..	22	8	3	..	11	16	8	20	2	34	10	20	9	16	14	10	6	12	8	20	10	30	5	200	83	20.0	8.3
Tolland	4	4	..	8	2	1	..	3	20	3	18	2	14	7	8	3	6	6	8	6	14	4	14	4	16	9	126	47	12.6	4.7
Total	283	255	1	539	103	72	1	176	570	152	475	105	515	245	541	227	519	222	496	250	569	233	479	211	437	209	5140	2030	514.0	203.0

* Includes one set of triplets.

† Includes two sets of triplets.

The following table exhibits the rate of illegitimate births to every 1,000 by counties:

Hartford County,	6.2	to	1,000	births.
New Haven "	5.4	"		"
New London "	4.5	"		"
Fairfield "	5.5	"		"
Windham "	10.0	"		"
Litchfield "	7.5	"		"
Middlesex "	10.8	"		"
Tolland "	5.1	"		"
Total,	6.1	"		"

TABLE XXII.—Still-Births, 1908.

White.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Mo. not stated.	Total.
Males	59	57	70	49	50	51	50	46	41	39	57	70	2	641
Females	40	29	42	33	34	30	40	31	33	31	27	35	....	405
Sex not stated	7	5	7	6	3	3	9	1	5	1	4	2	....	53
Colored.														
Males	2	2	4	1	1	2*	1*	1	1	1	1	1	....	18
Females	....	2	....	....	1	....	....	2	1	1	....	....	....	7
Grand Total	108	95	123	89	89	86	100	81	81	73	89	108	2	1124

* Includes one mixed.

TABLE XXIII.—SHOWING A NATIONALITY OF PARENTS BY COUNTIES—1908.

COUNTIES.	American.	Irish.	English.	German.	Canadian.	Scotch.	Welsh.	French.	Spanish.	Italian.	Swiss.	Austrian.	Belgian.	Hungarian.	Prussian.	Bohemian.	Danish.	Swedish.	Polish.	Norwegian.	Finland.	Russian.	Portuguese.	Newfoundland.	American and Foreign.	Mixed Foreign.	Other Foreign Countries.	Not stated.	Total.
Hartford	1961	330	36	162	104	16	---	16	---	824	2	203	---	41	2	---	34	292	241	2	6	697	2	3	682	208	62	35	5951
New Haven ..	2473	527	47	213	112	19	2	12	1	2202	4	307	7	89	2	6	27	143	300	9	35	912	2	1	1087	266	31	31	8867
New London .	821	93	27	36	113	5	---	3	---	154	---	48	---	1	---	---	2	9	89	5	1	179	18	---	294	60	18	11	1987
Fairfield	1926	231	65	92	25	18	---	2	---	752	3	441	---	511	---	3	20	104	51	6	3	313	---	1	601	174	42	238	5622
Windham	459	15	4	3	216	1	---	2	---	22	1	40	1	3	1	1	---	16	11	---	---	16	---	---	250	18	6	7	1093
Litchfield	675	47	8	45	18	1	---	16	---	196	10	57	---	29	---	---	---	45	59	1	1	130	---	---	192	34	13	8	1585
Middlesex	371	15	2	19	5	---	---	---	1	212	---	40	---	2	---	6	2	62	39	---	2	76	---	---	115	39	2	2	1012
Tolland	238	9	5	41	18	---	---	---	---	59	4	22	---	6	---	7	---	2	14	---	---	41	---	---	83	21	3	4	577
Total, 1908...	8924	1267	194	611	611	60	2	51	2	4421	24	1158	8	682	5	23	85	673	804	23	48	2364	22	5	3304	820	167	336	26694
1907...	8416	1534	208	753	565	83	2	318	1	3921	27	659	3	978	3	42	102	711	1097	16	46	1981	26	8	2774	859	104	708	25945
1906...	8388	1712	218	745	464	47	5	419	---	3329	23	902	7	541	2	27	77	763	942	21	48	1532	31	3	2801	921	337	336	24641
1905...	8328	1459	192	639	714	61	5	44	2	2668	36	734	2	704	1	21	81	724	---	16	39	2180	29	---	3264	810	156	352	23271
1904...	8599	1462	191	670	741	41	6	40	2	2523	36	689	6	503	9	14	72	728	346	15	42	1464	8	8	3319	801	206	323	22864
1903...	8236	1518	188	694	797	56	2	33	1	2149	35	627	1	463	13	17	70	720	354	18	32	1232	36	7	3276	817	87	275	21751
1902...	8283	1627	235	710	867	69	3	35	2	1812	31	563	4	409	1	10	70	751	255	15	33	1060	31	---	3133	790	60	357	21216
1901...	7815	1638	229	812	773	70	4	30	---	1486	28	479	2	427	11	---	74	721	252	20	35	977	31	14	3180	720	71	347	20246
1900...	8184	1720	252	820	838	84	7	41	---	1362	26	426	5	354	10	8	89	768	254	17	30	904	32	19	3247	781	44	279	20560
1899...	8299	1818	358	961	830	86	9	40	---	1252	26	339	1	337	13	10	82	853	208	14	25	926	23	10	3290	775	84	296	20855

TABLE XXIV.—BIRTH-RATE BY COUNTIES FOR 10 YEARS.

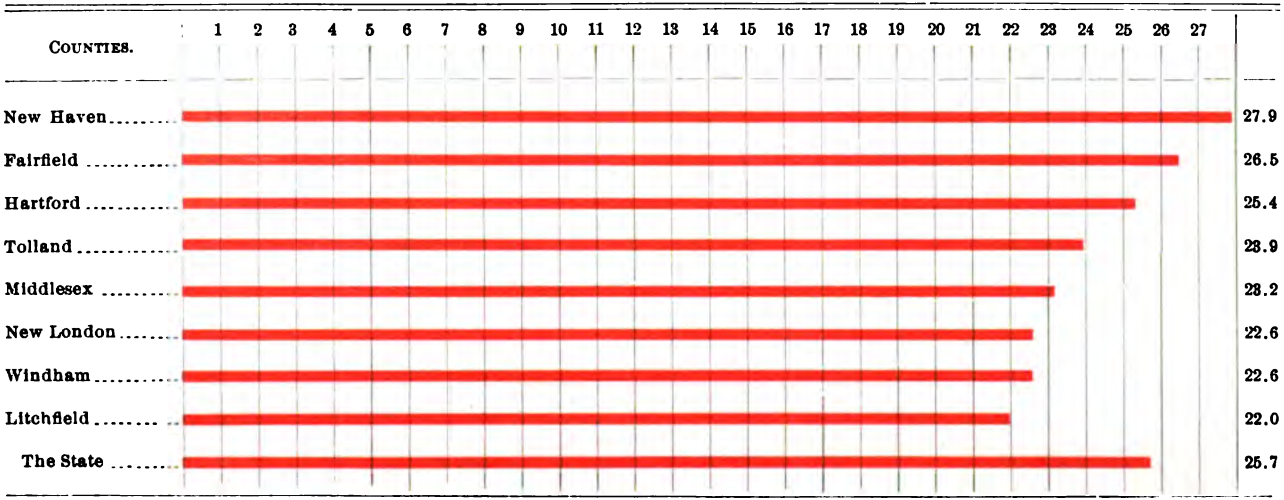
COUNTIES.	YEARS.									
	1908	1907	1906	1905	1904	1903	1902	1901	1900	1899
Hartford	25.4	24.7	24.1	23.6	23.4	22.4	21.4	22.0	22.1	23.1
New Haven	27.9	27.9	26.8	25.6	26.4	24.8	25.3	25.2	25.4	25.4
New London	22.6	22.5	23.4	22.6	23.1	22.3	22.2	20.5	21.2	20.3
Fairfield	26.5	26.8	25.2	22.5	22.8	22.6	22.1	21.7	22.0	22.7
Windham	22.6	20.7	20.0	21.0	21.0	21.7	21.8	21.1	21.6	21.5
Litchfield	22.0	22.0	20.6	21.1	20.6	20.3	20.7	20.0	21.1	21.4
Middlesex	23.2	21.6	21.0	21.1	19.2	16.8	16.4	17.6	16.8	17.2
Tolland	23.9	22.8	21.9	22.3	19.6	20.5	19.3	19.4	19.7	18.1
State of Connecticut	25.7	25.4	24.4	23.5	23.4	22.7	22.5	22.3	22.6	22.6

The following number of certificates were received from the towns mentioned too late for tabulation:

	1908.												No. not stated.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
Coventry (Births)					1								
Darien "	1												
Orange (Marriages)			2										
Salem (Births)									1				
Torrington "	1												
Union "	1												
Westport "										1			

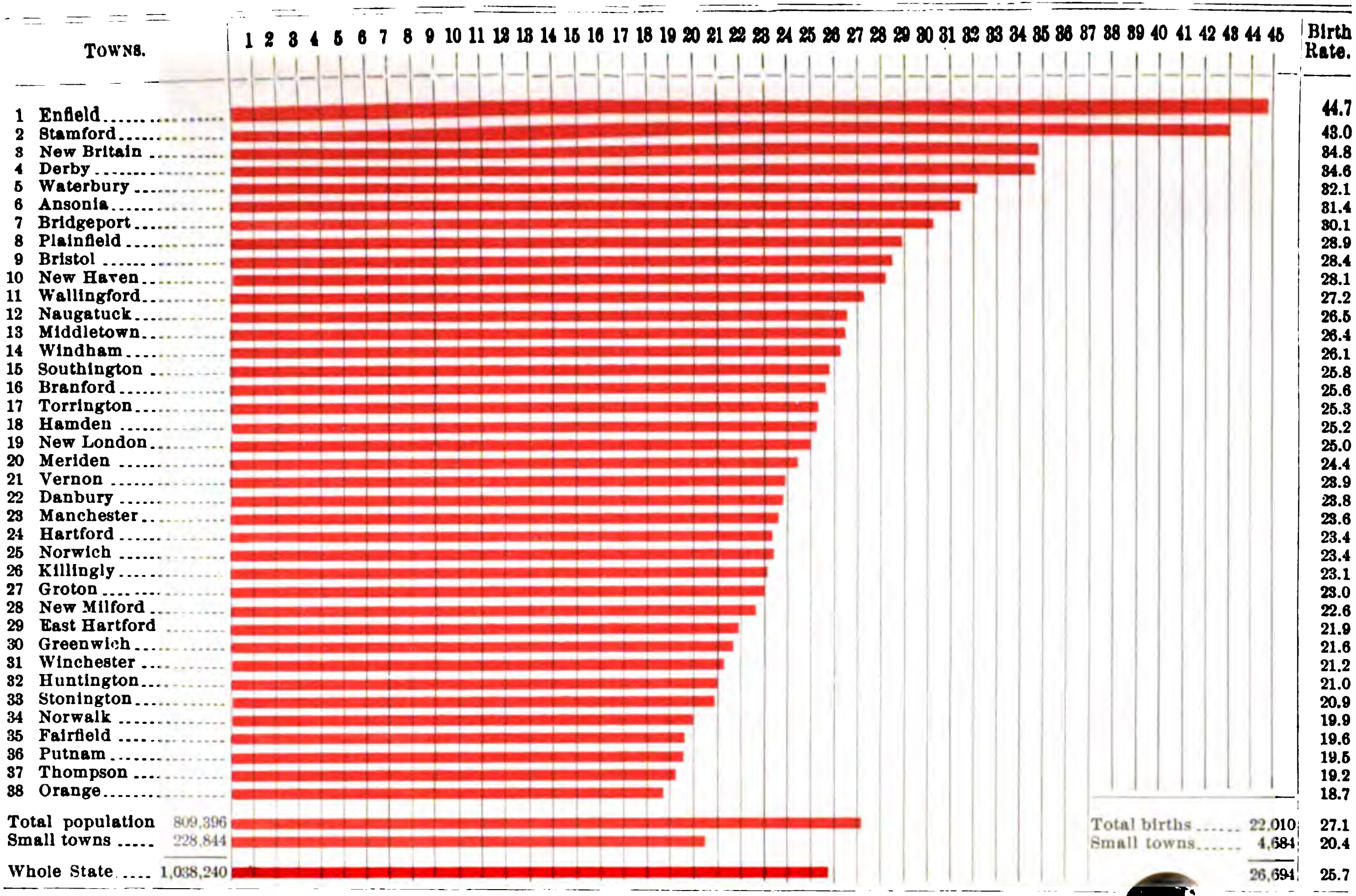
BIRTH RATE, 1908.

DIAGRAM A, SHOWING THE NUMBER OF BIRTHS TO EACH 1,000 OF THE POPULATION BY COUNTIES.



BIRTH RATE, 1908.

DIAGRAM B, SHOWING THE RATE OF BIRTHS TO EACH 1,000 OF THE POPULATION IN EVERY TOWN OF OVER 5,000 INHABITANTS, AND OF THE REMAINDER OF THE STATE.



MARRIAGES.

There were 8,565 marriages registered in the year 1908, being 1,198 more than in 1907.

This is one marriage to every 121.2 of the living population, or a marriage rate of 8.2 per 1,000, or 16.4 persons to 1,000.

TABLE XXV.—MARRIAGES.

BRIDES.	12 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	Age not stated.	TOTAL.
First Marriage	4	1,329	5,505	715	118	22	4	----	----	6	7,703
Second "	---	5	208	326	181	57	25	3	----	----	805
Third "	---	-----	1	11	15	10	3	----	----	---	40
Fourth "	---	-----	-----	1	1	4	2	----	----	----	8
Number not stated	---	-----	4	4	1	----	----	----	----	----	9
Total, 1908	4	1,334	5,718	1,057	316	93	34	3	----	6	8,565
1907	4	1,515	6,677	1,132	290	100	23	6	----	16	9,763
1906	6	1,294	6,333	1,061	267	77	24	1	----	9	9,072
1905	2	1,089	5,597	977	251	110	35	3	----	11	8,075
1904	2	1,050	5,245	945	277	80	27	1	----	8	7,635
1903	7	1,122	5,637	950	242	88	22	4	1	5	8,078
1902	2	1,044	5,324	918	252	82	28	1	----	9	7,660
1901	8	960	4,962	848	237	72	18	2	1	4	7,112
1900	4	948	4,907	799	231	71	23	4	----	4	6,991
1899	3	888	4,804	820	229	70	13	3	----	13	6,843
GROOMS.											
First Marriage	---	152	5,801	1,289	223	29	11	1	----	2	7,508
Second "	---	1	112	347	283	145	65	19	3	----	975
Third "	---	-----	-----	12	16	21	11	7	1	----	68
Fourth "	---	-----	-----	-----	----	----	2	----	----	----	2
Number not stated	---	-----	4	4	3	1	----	----	----	----	12
Total, 1908	---	153	5,917	1,652	525	196	89	27	4	2	8,565
1907	---	155	6,882	1,910	504	205	78	23	2	4	9,763
1906	---	143	6,391	1,772	503	159	82	18	2	2	9,072
1905	---	103	5,574	1,670	432	182	78	21	1	4	8,075
1904	---	108	5,236	1,562	466	161	76	17	2	7	7,635
1903	---	104	5,572	1,698	453	170	64	15	1	1	8,078
1902	---	89	5,235	1,598	474	173	68	19	----	4	7,660
1901	---	100	4,806	1,550	410	174	54	16	1	1	7,112
1900	---	92	4,759	1,466	435	161	54	21	1	2	6,991
1899	---	97	4,681	1,459	382	135	64	20	1	4	6,843

The number of persons who were married in each County in 1908 was to every 1,000 of the population as follows :

Hartford County,	17.4	New Haven County,	16.0
New London County,	16.2	Fairfield County,	18.7
Windham County,	15.0	Litchfield County,	12.7
Middlesex County,	13.2	Tolland County,	14.1

It will be observed that Fairfield County shows the highest marriage rate, and Litchfield County the lowest.

The number of persons who were married in 1907 in each County was to every 1,000 of the population as follows :

Hartford County, 20.3 ; New Haven County, 19.4; New London County, 18.1 ; Fairfield County, 20.6 ; Windham County, 16.7 ; Litchfield County, 15.0 ; Middlesex County, 17.1 ; Tolland County, 13.8.

First Marriages and Re-marriages.—The marriages of bachelors and spinsters constituted 88.7 per cent. of the total ; those of widows and widowers, 11.0 per cent.; while in .1 per cent. the condition was not stated.

Of the males married in the year, 1.7 per cent. were boys under 20 years old.

Of the females under 20 there were 15.6 per cent.

Table XXV exhibits more in detail the foregoing facts.

MARRIAGES BY MONTHS—1908.

This Table shows the number of Marriages in each town in each month.

TOWNS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Andover	---	1	---	---	---	---	---	---	---	---	---	1	2
Ansonia	6	13	1	11	13	16	8	11	8	21	17	3	128
Ashford	---	2	---	---	---	1	---	1	---	---	---	---	4
Avon	---	---	---	---	---	1	---	---	---	---	1	1	3
Barkhamsted	---	---	---	---	---	---	---	---	---	1	---	---	1
Beacon Falls	1	2	---	---	2	1	---	1	1	4	1	---	13
Berlin	---	2	---	2	1	1	1	1	5	3	3	1	20
Bethany	---	---	---	---	---	---	---	---	---	---	---	---	--
Bethel	3	---	---	1	---	6	4	1	1	2	---	1	19
Bethlehem	---	---	---	---	---	---	---	1	---	---	---	---	1
Bloomfield	1	---	---	---	---	2	---	---	1	---	1	1	6
Bolton	---	---	---	---	1	---	---	---	---	---	---	---	1
Bozrah	---	---	---	---	---	---	---	---	---	---	---	---	--
Branford	3	6	4	2	1	2	3	8	2	8	2	4	45
Bridgeport	80	79	43	64	67	114	49	66	68	109	94	53	886
Bridgewater	---	---	---	---	---	---	---	---	---	---	---	---	--
Bristol	13	9	7	4	3	12	6	4	11	17	20	4	110
Brookfield	---	---	---	---	---	---	---	---	---	---	---	---	---
Brooklyn	1	1	1	---	2	1	---	2	2	5	---	---	15
Burlington	---	---	---	1	---	---	1	---	---	1	---	---	3
Canaan	---	---	---	1	---	1	---	1	---	1	---	---	4
Canterbury	---	1	---	---	---	---	---	---	1	---	---	---	2
Canton	2	3	1	1	2	4	4	2	---	2	2	3	26
Chaplin	---	---	---	---	---	---	2	---	---	1	---	---	3
Chatham	1	---	2	1	1	1	1	---	1	1	---	1	10
Cheshire	---	1	1	---	2	2	1	1	2	1	---	---	11
Chester	2	4	---	1	---	3	2	1	4	2	---	1	20
Clinton	1	1	1	---	---	---	1	---	---	2	---	---	6
Colchester	2	1	1	2	4	4	3	3	3	4	1	1	29
Colebrook	1	---	---	---	1	1	---	---	1	---	1	---	5
Columbia	---	1	---	---	1	2	---	1	1	---	---	---	6
Cornwall	2	---	---	---	---	1	1	---	1	1	---	---	6
Coventry	---	---	1	1	1	---	---	---	---	---	1	---	4
Cromwell	---	---	---	---	---	2	---	---	5	---	---	---	7
Danbury	18	11	6	22	18	25	12	8	10	23	22	10	185
Darien	2	---	---	2	---	2	2	5	2	6	2	1	24
Derby	9	3	2	2	11	19	15	12	4	12	10	3	102
Durham	---	---	---	1	1	2	---	---	---	1	---	---	5
Eastford	---	---	---	---	1	---	---	1	---	---	---	1	3
East Granby	1	---	---	1	---	---	---	---	---	---	---	1	3
East Haddam	---	---	---	1	---	2	1	1	---	---	2	---	7
East Hartford	3	3	1	4	3	6	6	5	8	6	4	1	50
East Haven	2	---	---	---	---	1	---	1	---	---	1	1	6
East Lyme	---	2	4	---	---	1	1	2	---	1	---	1	12
Easton	---	---	---	1	---	---	1	---	---	1	1	---	4

MARRIAGES BY MONTHS—*Continued*—1908.

TOWNS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
East Windsor	3	1	1	---	3	2	2	1	2	2	---	---	17
Ellington	---	---	1	1	1	5	---	1	1	1	---	---	11
Enfield	11	17	6	8	12	11	12	5	14	11	19	3	129
Essex	2	---	---	---	1	2	---	---	1	1	2	---	9
Fairfield	---	2	---	1	---	7	---	1	2	7	3	---	23
Farmington	1	1	2	1	3	1	1	1	3	2	2	---	18
Franklin	---	---	---	---	---	---	---	---	---	---	---	---	-----
Glastonbury	1	1	---	---	2	8	3	2	2	3	2	1	25
Goshen	---	---	---	---	---	---	1	---	---	---	---	1	2
Granby	---	---	1	---	---	1	---	---	1	---	1	---	4
Greenwich	9	17	8	12	14	24	10	12	17	24	21	14	182
Griswold	4	7	1	2	3	3	2	3	3	4	1	1	34
Groton	5	1	2	3	1	3	2	1	6	2	4	7	37
Guilford	---	3	---	2	1	3	1	---	1	6	3	1	21
Haddam	2	3	---	---	---	1	1	---	---	---	---	1	3
Hamden	2	3	---	1	2	2	---	1	3	---	5	4	28
Hampton	---	---	---	---	---	1	---	1	2	1	---	1	6
Hartford	62	65	39	58	60	119	54	75	87	107	85	50	861
Hartland	---	---	---	---	---	---	---	---	---	1	2	1	4
Harwinton	1	---	---	---	1	1	---	1	---	---	---	1	5
Hebron	1	---	---	1	---	1	2	---	---	---	2	---	7
Huntington	1	1	4	3	2	7	3	7	3	3	4	1	39
Kent	---	---	---	---	---	1	---	---	---	---	---	1	2
Killingly	6	5	1	4	7	8	4	4	5	6	5	2	57
Killingworth	---	---	---	1	---	---	---	---	1	---	1	---	3
Lebanon	---	---	---	1	---	1	---	---	2	2	2	1	9
Ledyard	---	---	---	---	---	---	---	---	---	1	---	2	3
Lisbon	---	---	---	---	---	---	---	---	---	---	---	1	1
Litchfield	3	---	2	3	1	1	2	---	2	3	2	2	21
Lyme	---	---	---	---	1	1	1	1	1	---	---	---	5
Madison	---	---	---	---	1	---	1	---	1	2	---	---	5
Manchester	3	9	1	9	10	14	4	14	18	8	12	2	104
Mansfield	---	---	---	---	---	---	---	1	---	2	1	---	4
Marlborough	---	---	---	---	1	---	---	---	---	---	---	---	1
Meriden	18	16	6	16	10	27	12	7	11	36	26	12	197
Middlebury	---	---	1	---	---	---	---	---	1	1	---	---	3
Middlefield	---	---	---	---	---	---	1	---	---	1	1	---	3
Middletown	13	15	6	6	12	19	13	24	19	17	11	14	169
Milford	3	1	3	1	---	6	3	6	4	4	4	2	37
Monroe	---	---	---	---	---	1	1	---	2	1	---	---	5
Montville	---	---	---	---	1	4	2	1	1	1	2	1	13
Morris	---	---	---	---	---	---	---	---	---	---	---	---	-----
Naugatuck	4	9	2	---	6	12	5	12	6	10	14	7	87
New Britain	40	55	20	11	45	63	36	29	39	54	33	16	441
New Canaan	---	1	2	1	3	4	2	3	4	5	3	2	30
New Fairfield	---	---	---	---	1	---	---	---	1	---	---	---	2
New Hartford	1	1	2	---	2	1	3	2	1	2	4	1	20
New Haven	90	70	65	64	64	142	87	84	100	146	138	80	1130
Newington	---	---	1	---	2	1	1	---	1	1	---	1	8
New London	20	19	9	25	13	16	18	16	23	18	22	18	217

MARRIAGES BY MONTHS—*Continued*—1908.

TOWNS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
New Milford	2	3	3	1	3	6	---	4	2	4	2	2	32
Newtown	---	2	1	2	---	4	2	1	2	2	3	---	19
Norfolk	---	---	---	---	---	2	1	1	1	1	---	---	6
North Branford	1	---	---	---	---	2	---	---	1	1	1	1	7
North Canaan	1	2	1	2	3	1	2	1	---	---	1	1	15
North Haven	---	---	---	1	2	---	2	1	---	---	1	---	7
North Stonington	1	---	---	1	---	3	2	---	2	---	1	---	10
Norwalk	16	9	13	13	8	21	15	13	18	16	21	21	184
Norwich	17	23	14	15	15	35	16	17	27	17	24	13	233
Old Lyme	---	---	---	1	2	---	---	---	1	---	1	---	5
Old Saybrook	---	---	---	---	---	1	2	---	1	---	---	2	6
Orange	5	3	3	4	2	15	1	5	4	5	3	1	51
Oxford	---	---	1	2	---	1	3	---	1	1	1	---	10
Plainfield	3	4	2	4	5	4	---	5	1	5	8	3	44
Plainville	2	---	---	---	2	1	3	4	1	2	---	2	17
Plymouth	2	3	---	---	4	3	3	2	7	3	4	---	31
Pomfret	---	1	---	---	---	2	---	---	---	---	1	---	4
Portland	---	2	1	5	2	3	3	1	---	3	2	---	22
Preston	---	---	---	1	---	1	---	---	1	---	---	1	4
Prospect	---	---	---	---	---	---	---	---	---	---	---	---	--
Putnam	6	6	6	4	6	6	5	5	11	6	11	4	76
Redding	---	---	---	---	---	---	---	1	1	3	1	2	8
Ridgefield	---	---	---	3	4	1	---	1	2	1	---	---	12
Rocky Hill	1	---	---	---	---	---	---	---	1	---	1	---	3
Roxbury	2	---	---	---	2	1	---	---	---	1	1	---	7
Salem	---	---	---	1	---	1	---	---	1	---	---	---	3
Salisbury	2	4	3	---	2	7	2	2	2	2	1	2	29
Saybrook	---	1	---	---	2	3	---	1	---	---	1	---	8
Scotland	---	---	---	---	---	---	---	2	1	---	---	---	3
Seymour	1	5	1	3	3	3	5	2	3	4	1	3	34
Sharon	---	1	2	2	---	1	---	---	1	---	1	2	10
Sherman	---	---	---	---	---	---	---	---	2	---	---	---	2
Simsbury	3	3	1	2	2	4	2	3	2	2	1	5	30
Somers	---	---	---	---	---	1	1	1	1	2	---	---	6
Southbury	1	---	1	1	---	---	---	---	3	---	---	---	6
Southington	---	7	2	3	1	3	3	1	3	5	7	1	36
South Windsor	---	---	---	1	---	---	---	---	---	1	1	---	3
Sprague	2	1	---	1	2	1	---	3	2	2	1	1	16
Stafford	3	3	5	3	7	2	1	2	1	4	5	6	42
Stamford	18	20	20	21	15	33	31	23	27	31	37	18	294
Sterling	1	1	---	1	---	---	---	---	1	---	1	2	7
Stonington	2	6	5	2	5	5	8	5	3	8	8	8	65
Stratford	1	3	2	3	1	7	2	---	3	2	3	1	28
Suffield	---	2	1	---	3	4	2	1	2	3	1	---	19
Thomaston	---	1	1	3	---	3	1	3	1	3	1	2	19
Thompson	2	3	---	1	2	6	1	1	5	5	1	3	30
Tolland	---	---	---	---	---	---	2	1	1	---	1	---	5
Torrington	18	11	6	7	9	20	10	12	10	12	13	7	135
Trumbull	1	1	---	---	---	---	---	---	---	1	---	---	3
Union	---	---	---	---	---	---	---	---	---	---	---	---	--

MARRIAGES BY MONTHS—*Concluded.*

TOWNS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Vernon	5	7	3	7	7	15	10	7	5	3	8	1	78
Voluntown	1	---	1	1	---	1	---	1	---	1	---	---	6
Wallingford	7	2	4	4	8	6	8	3	2	9	8	6	67
Warren	---	---	---	---	---	---	---	---	---	1	1	2	4
Washington	---	---	---	2	---	4	---	---	3	2	---	---	11
Waterbury	57	46	23	31	49	55	45	37	48	60	64	29	544
Waterford	2	---	---	1	---	3	1	---	2	---	---	1	10
Watertown	2	---	1	---	1	4	2	2	---	2	4	1	19
Westbrook	---	1	---	---	---	---	1	---	2	1	---	1	6
West Hartford	---	---	1	---	1	3	1	---	2	1	2	2	13
Weston	---	---	---	---	---	1	---	---	---	1	2	---	4
Westport	3	1	1	2	1	2	3	1	---	3	6	2	25
Wethersfield	---	1	1	---	2	---	---	---	---	4	2	1	11
Willington	1	---	---	---	---	2	1	---	---	---	---	---	4
Wilton	---	1	---	2	---	1	---	---	2	3	---	---	9
Winchester	5	2	---	4	6	11	2	5	3	12	10	2	62
Windham	4	6	7	6	5	12	9	9	12	11	9	6	96
Windsor	1	1	2	3	1	4	5	3	1	10	4	4	39
Windsor Locks	6	5	1	2	2	3	4	4	5	6	4	1	43
Wolcott	---	---	---	---	---	1	1	---	1	1	1	---	5
Woodbridge	---	---	---	---	1	1	---	---	---	---	---	---	2
Woodbury	---	---	---	---	1	3	2	1	1	1	---	1	10
Woodstock	---	---	---	1	---	2	1	1	2	3	---	2	12
Total	668	673	402	541	621	1111	642	655	784	1025	921	522	8565

MARRIAGES BY MONTHS.—1908.

This Table shows the number of Marriages in each County.

Hartford County	164	185	89	111	161	268	151	155	209	252	210	102	2041
New Haven County	210	183	118	145	178	317	201	192	207	332	301	157	2547
New London County	56	60	37	57	47	83	56	53	78	61	67	57	712
Fairfield County	152	148	100	153	134	260	137	143	167	244	223	126	1987
Windham County	23	30	17	21	28	43	22	32	43	43	36	24	362
Litchfield County	42	28	21	25	36	73	32	38	36	52	46	28	457
Middlesex County	21	27	10	16	19	39	26	28	34	29	20	20	289
Tolland County	10	12	10	13	18	28	17	14	10	12	18	8	170
State	668	673	402	541	621	1111	642	655	784	1025	921	522	8565

TABLE XXVI.—COMPARATIVE AGES OF AMERICAN AND FOREIGN-BORN MOTHERS—1908.

NO. OF MOTHERS AT BIRTH OF—	AMERICAN MOTHERS.																		FOREIGN MOTHERS.																		TOTAL FOR TEN YEARS.		Nationality and age not stated.
									TOTALS.																		TOTALS.												
	Under 15.	15–18.	18–20.	20–30.	30–40.	40–50.	50–60.	Age not stated.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.	Under 15.	15–18.	18–20.	20–30.	30–40.	40–50.	50–60.	Age not stated.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.	American.	Foreign.	
1st child	4	159	446	2501	517	22		18	3667	3284	3171	3290	3312	3212	3100	3031	2995	3014		102	478	2752	313	11		23	3679	3729	3363	2706	2632	2496	2304	2201	2231	2143	32076	27484	33
2d "	1	15	114	1655	654	35		17	2491	2309	2376	2396	2370	2243	2250	2022	2164	2263		5	96	2463	513	14		18	3109	2976	2850	2502	2296	2181	2002	1841	1815	1889	22884	23461	35
3d "		1	19	885	633	45		7	1590	1520	1478	1527	1526	1454	1462	1422	1482	1468			9	1665	705	28		8	2415	2366	2250	1998	1849	1712	1615	1567	1577	1632	14929	18981	12
4th "			2	444	502	40		5	993	923	979	968	990	931	966	971	1011	1063			2	944	828	58		13	1845	1846	1733	1524	1438	1299	1370	1241	1364	1314	9795	14974	18
5th "				210	426	52		8	696	619	616	592	708	675	669	687	723	744			1	487	824	74		8	1394	1313	1243	1164	1195	1153	1032	1053	1017	1071	6729	11635	9
6th "				93	304	41		3	441	423	427	420	439	488	501	464	458	480				209	692	87		4	992	937	983	911	879	776	795	787	746	775	4541	8581	6
7th "				30	195	38		3	266	279	303	329	319	315	329	312	352	330				90	531	101		4	726	714	678	629	630	616	601	572	571	563	3184	6300	9
8th "				6	171	40			217	203	182	202	219	198	196	180	219	199				30	375	96	1	3	505	497	480	476	480	467	456	417	396	392	2015	4566	8
9th "				5	92	30	1		128	125	107	111	147	183	140	139	142	167				7	232	87		1	327	335	319	331	308	330	282	263	280	268	1389	3043	3
10th "				1	48	29		1	79	76	82	70	81	86	88	86	89	85				2	165	87	1	2	257	201	224	251	209	189	182	184	178	176	822	2051	
11th "				1	29	16			46	52	37	65	56	57	52	46	46	60				1	77	60		1	139	159	137	133	141	115	124	117	107	112	517	1284	3
12th "					11	14			25	20	21	31	30	31	30	28	31	28				1	53	60	1		115	78	80	91	73	81	65	65	78	77	275	803	
13th "					10	6			16	16	7	15	16	11	23	17	15	20					18	28		1	47	48	48	34	40	35	45	41	41	38	156	417	
14th "					6	5			11	6	3	11	12	5	6	7	11	7					11	15			26	29	19	21	21	27	21	25	27	24	79	240	
15th "					2	2			4	4	3	9	4	3	4	4	3	1					2	7			9	18	14	15	17	14	15	9	9	20	39	140	
16th "					1				1	1	1		5	1	2		5	1					2	4		1	7	7	6	7	6	4	6	14	5	9	17	71	
17th "						2			2		1	1	2				3	1						3			3	5	2	1	3	12	5	7	3	2	10	43	
18th "												1					2	1						1			1	1	1	2	2	3	4	2	1	4	4	21	
19th "														1		1		1						1			1		1				2	1			3	5	
20th "												1		1	1			1											1	1	1					1	4	4	
21st "																												1			1					2		4	
22d "																																				1		1	
23d "															1																			1			1	1	
24th "																																1						1	
No. not stated			1	3	2	1		2	9	12	9	16	20	44	40	24	31	43			19	50	6		1	3	79	105	70	67	64	76	78	60	53	69	248	716	200
Total	5	175	582	5834	3603	418	1	64	10682	9872	9803	10055	10256	9889	9860	9441	9782	9977	..	107	606	8701	5347	822	4	90	15676	15365	14502	12864	12285	11587	11009	10458	10499	10582	99617	124827	336

TABLE XXVII.—DIVORCES GRANTED IN THE STATE OF CONNECTICUT BY THE SUPERIOR COURT DURING 1908.

CAUSES.	Hartford Co.	New Haven Co.	New London Co.	Fairfield Co.	Windham Co.	Litchfield Co.	Middlesex Co.	Tolland Co.	Total.
Adultery	19	15	2	30	6	5	4	3	84
Bigamy	2	----	----	----	----	----	----	----	2
Cruelty	19	29	3	25	4	2	2	----	84
Cruelty and Desertion	----	----	----	2	----	1	----	----	3
Cruelty and Intemperance	----	1	----	6	----	1	----	----	8
Desertion	77	88	26	71	13	16	9	2	302
Desertion and Adultery	----	----	----	1	----	----	----	----	1
Desertion and Intemperance	----	1	----	----	----	5	----	----	6
Intemperance	21	18	5	12	7	----	1	2	66
Imbecility	1	----	----	----	----	----	----	----	1
Infamous Crime	----	----	----	1	----	----	----	----	1
State Prison for Life	----	----	----	1	----	----	----	----	1
Total	139	152	36	149	30	30	16	7	559

TABLE XXVIII.—DIVORCES FOR PAST 10 YEARS.

COUNTIES.	1908.	1907.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.
Hartford	139	109	101	73	84	106	68	91	92	83
New Haven	152	206	195	153	134	181	132	168	137	110
New London	36	45	51	55	52	45	61	45	52	33
Fairfield	149	131	151	123	120	114	127	132	94	114
Windham	30	29	14	28	26	27	31	20	21	28
Litchfield	30	45	40	32	31	36	22	29	17	33
Middlesex	16	16	19	10	17	15	10	16	22	13
Tolland	7	15	4	17	13	11	11	10	17	17
Total	559	596	575	491	477	535	462	511	452	431

TABLE XXIX.—Showing the Number of Divorced Persons who have Re-married in 1908. By Counties.

Counties.	Women.	Men.
Hartford	50	43
New Haven	50	89
New London	23	25
Fairfield	72	80
Windham	17	18
Litchfield	15	9
Middlesex	5	3
Tolland	2	5
Total	234	272

During the year 1908 there were 559 divorces granted, or 1,118 individuals divorced; and during the year there were 506 divorced persons who were married again.

TABLE XXX.—Showing the Number of Widows and Widowers who have Re-married in 1908. By Counties.

Counties.	Widows.	Widowers.
Hartford	138	185
New Haven	188	224
New London	48	58
Fairfield	150	185
Windham	18	55
Litchfield	24	44
Middlesex	19	35
Tolland	8	15
Total	593	801

There were 208 more widowers who were re-married than widows last year.

Among the divorced persons there were 38 more men than women.

DEATHS.

The registered mortality in 1908 exclusive of still-births numbered 16,000, which was 1,490 less than in the preceding year.

Upon the estimated population, 1,038,240, the death-rate was 15.4 per 1,000 living population.

The deaths of males on record numbered 8,485 ; of females 7,513 ; of 2 decedent the sex is not stated.

The greatest mortality was registered in January, amounting to 1,557. The smallest mortality was registered in November, amounting to 1,144.

The annual rates represented by the deaths in each quarter were as follows :

	Total Deaths.
First quarter, 17.4 per 1,000 of living population	4,529
Second " 14.1 " "	3,682
Third " 15.9 " "	4,148
Fourth " 14.0 " "	3,641
	16,000

The annual death-rate was 15.4.

The average age of decedents was 40 years and 4 months.

DEATHS BY CLASSES.

The International Classification of the causes of death, formerly known as the Bertillon system, is employed by the U. S. government and is now adopted in Connecticut, in common with most of the other States and many of the cities which make a systematic registration of vital statistics.

From the causes of death as registered under the different classes the percentage of each was as follows :

	Deaths.	Percentage to Total Mortality.
From the General Diseases	4 133	25.83
Nervous System	1,807	11.29
Circulatory Apparatus	1,997	12.48
Respiratory System	1,858	11.61
Digestive Apparatus	1,953	12.21
Genito-Urinary Apparatus and its Adnexa	1,253	7.83
The Puerperal State	121	.75
Skin and Cellular Tissue	67	.41
Organs of Locomotion	36	.22
Malformations	166	1.03
Early Infancy	888	5.55
Old Age	304	1.90
Affections produced by External Causes	1,207	7.54
Ill-defined	210	1.31

Typhoid Fever was fatal in 194 instances during the year, which was 16 less than in the year before.

DEATHS FROM TYPHOID FEVER BY COUNTIES FOR 54 YEARS—1855-1908.

	Hartford County.	New Haven County.	New London County.	Fairfield County.	Windham County.	Litchfield County.	Middlesex County.	Tolland County.	Total.	Per cent. to known causes.
1855	58	62	32	15	25	28	27	20	273	5.50
1856	47	62	31	16	29	30	20	15	256	4.62
1857	61	58	28	15	27	35	29	14	267	4.55
1858	68	68	25	35	25	34	16	24	285	4.89
1859	78	55	25	48	26	36	17	22	307	5.30
1860	59	91	24	28	35	40	20	17	314	5.60
1861	92	74	32	34	42	32	23	31	360	5.25
1862	99	83	45	46	24	36	24	24	381	5.10
1863	112	96	61	39	19	45	28	27	427	5.71
1864	97	117	52	43	18	54	29	32	442	5.44
1865	129	97	80	50	60	57	42	27	548	7.79
1866	77	79	49	37	36	20	15	19	332	4.95
1867	117	105	38	38	25	46	19	28	415	6.39
1868	81	104	32	33	31	30	30	25	366	5.54
1869	84	130	35	59	38	48	38	30	458	5.63
1870	87	124	31	54	37	44	35	25	427	5.49
1871	64	111	25	53	31	34	29	5	352	4.93
1872	134	134	37	67	39	39	32	24	506	5.76
1873	114	117	37	43	33	41	24	21	430	5.00
1874	69	109	48	31	32	32	28	21	370	4.68
1875	103	119	38	45	40	44	32	28	449	3.11
1876	76	79	42	42	25	32	12	20	328	3.58
1877	80	80	33	40	25	26	17	28	329	3.32
1878	39	55	30	28	27	27	25	15	346	2.70
1879	30	24	34	26	14	15	5	11	169	1.77
1880	40	47	32	31	34	21	19	18	242	2.51
1881	52	68	23	32	30	18	19	15	257	2.45
1882	64	76	35	35	37	28	24	25	325	3.10
1883	49	118	26	29	28	18	14	20	292	2.14
1884	61	93	29	30	25	11	16	16	281	2.47
1885	66	56	22	31	18	19	8	7	227	1.09
1886	50	70	19	30	29	21	13	12	244	2.15
1887	33	51	15	37	19	14	12	14	195	1.16
1888	75	95	16	31	28	21	15	11	292	2.21
1889	62	62	26	68	20	21	6	16	281	2.25
1890	64	103	24	42	17	21	31	10	312	3.28
1891	76	77	23	49	26	15	24	11	301	2.09
1892	93	85	35	45	14	10	18	9	309	2.03
1893	72	76	21	42	17	24	16	7	275	1.84
1894	83	66	23	21	18	18	13	8	250	1.82
1895	61	72	8	75	13	20	6	4	259	1.78
1896	45	61	21	32	18	17	10	3	207	1.37
1897	39	49	9	28	8	7	5	6	151	1.08
1898	58	69	15	21	6	9	6	5	189	1.33
1899	67	61	15	25	6	14	5	3	186	1.28
1900	90	83	18	42	17	16	8	4	278	1.69
1901	53	143	7	44	6	9	8	5	275	1.85
1902	35	81	15	52	4	6	6	8	207	1.43
1903	45	81	15	44	7	7	7	2	208	1.34
1904	31	60	7	34	11	8	6	6	163	1.02
1905	36	90	15	41	9	13	2	7	213	1.30
1906	46	105	11	29	9	12	9	2	223	1.33
1907	53	79	12	43	4	8	9	2	210	1.20
1908	44	72	11	35	9	13	5	5	194	1.21

Measles.—This disease caused 88 deaths, which was 10 more than the year before.

They were fatal

In	8	towns	in	Hartford	County	with	23	deaths.
“	5	“	“	New Haven	“	“	35	“
“	5	“	“	New London	“	“	8	“
“	4	“	“	Fairfield	“	“	16	“
“	1	town	“	Windham	“	“	1	death.
“	2	towns	“	Litchfield	“	“	3	deaths.
“	2	“	“	Tolland	“	“	2	“
State,	27						88	

Scarlatina was fatal in 60 instances during the year, which was 7 less than in the year before.

In	6	towns	in	Hartford	County	with	20	deaths.
“	5	“	“	New Haven	“	“	10	“
“	5	“	“	New London	“	“	10	“
“	7	“	“	Fairfield	“	“	15	“
“	4	“	“	Litchfield	“	“	4	“
“	1	town	“	Tolland	“	“	1	death.
State,	28						60	

Whooping Cough was fatal in 95 instances, which was 46 less than the year before.

In	5	towns	in	Hartford	County	with	30	deaths.
“	4	“	“	New Haven	“	“	27	“
“	8	“	“	Fairfield	“	“	27	“
“	3	“	“	Windham	“	“	3	“
“	5	“	“	Litchfield	“	“	6	“
“	1	town	“	Middlesex	“	“	1	death.
“	1	“	“	Tolland	“	“	1	“
State,	27						95	

The mortality from *Diphtheria and Croup* was 194, being 44 less than the year before.

In	10	towns in	Hartford	County	with	37	deaths.
"	9	" "	New Haven	"	"	70	"
"	4	" "	New London	"	"	7	"
"	9	" "	Fairfield	"	"	45	"
"	6	" "	Windham	"	"	8	"
"	5	" "	Litchfield	"	"	8	"
"	4	" "	Middlesex	"	"	13	"
"	3	" "	Tolland	"	"	6	"
State,	50					194	

The mortality from *La Grippe* was 396, being 126 less than the year before and occurred in counties as follows:

In	21	towns in	Hartford	County	with	76	deaths.
"	19	" "	New Haven	"	"	119	"
"	12	" "	New London	"	"	40	"
"	16	" "	Fairfield	"	"	67	"
"	10	" "	Windham	"	"	41	"
"	13	" "	Litchfield	"	"	23	"
"	5	" "	Middlesex	"	"	8	"
"	7	" "	Tolland	"	"	22	"
State,	103					396	

MORTALITY FROM PROMINENT DISEASES.

10 YEARS.

YEARS.	DISEASES.									
	Small Pox and Varioloid.	Measles.	Scarlet Fever.	La Grippe.	Typhoid Fever.	Whooping Cough.	Diphtheria and Membranous Croup.	Infantile Diarrhœa.	Dysentery.	Totals.
1899	--	46	50	660	186	139	237	948	161	2427
1900	--	189	68	667	278	144	314	1306	157	3123
1901	5	77	84	668	275	116	298	801	140	2464
1902	14	45	169	161	207	154	256	849	154	2009
1903	1	232	148	362	208	241	246	785	122	2345
1904	--	83	83	409	163	64	216	954	100	2072
1905	--	57	51	237	213	81	229	1096	116	2080
1906	--	159	57	207	223	242	273	1047	106	2314
1907	--	78	67	522	210	141	238	1146	101	2503
1908	--	88	60	396	194	95	194	1091	83	2201
Aver'ge	2.	105.	83.	428.	215.	141.	250.	1002.	124.	2353.

MORTALITY FROM SPECIAL DISEASES.

Phthisis.—Consumption numbered 1,391.

Cancer.—The total number of deaths registered as caused by cancer in its various forms was 791.

Diabetes.—There were registered 176 deaths ascribed to diabetes, against 174 of the year before.

Old Age.—It is recorded that 304 died a natural death—namely old age.

Apoplexy was registered as the cause of death in 923 cases, against 1,006 of the year before.

Organic Diseases of the Heart.—1,326 deaths, against 1,452 in the year 1907.

Pneumonia, including Broncho Pneumonia.—Total 1,370, against 1,739 in the preceding year.

Bronchitis, Acute and Chronic.—342, against 384 of the year before.

Appendicitis.—94 deaths ; in 1907 there were 96.

Diseases of Kidneys, Acute and Chronic.—1038, against 998 in 1907.

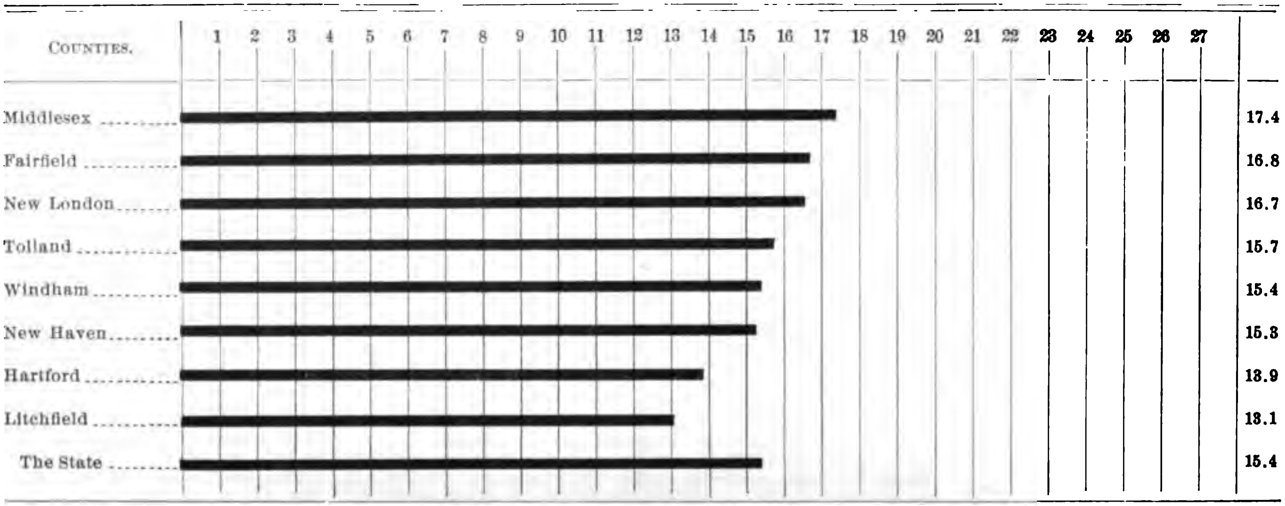
There were 1490 less deaths in the year 1908 than in the preceding year.

MORTALITY FROM PRINCIPAL LOCAL DISEASES—10 YEARS.

YEARS.	DISEASES.										
	Apoplexy.	Paralysis.	Insanity.	Convulsions.	Heart Disease.	Bronchitis.	Pneumonia.	Pleurisy.	Peritonitis.	Bright's Disease, Nephritis, and other Kidney Diseases.	Totals.
1899	773	47	83	201	919	419	1058	33	82	805	4420
1900	795	57	39	242	805	505	1504	36	76	942	5001
1901	825	197	34	158	783	434	1301	32	68	841	4673
1902	889	219	24	170	979	390	1217	23	78	889	4878
1903	969	183	18	125	1000	410	1386	45	82	962	5180
1904	1030	193	27	145	988	375	1440	36	83	1049	5366
1905	1057	194	32	155	1224	360	1495	43	69	959	5588
1906	947	186	54	168	1287	418	1586	22	58	937	5663
1907	1006	174	43	147	1452	384	1739	43	53	998	6039
1908	923	178	36	137	1326	342	1370	33	32	1038	5415
Aver'ge	921.	162.	39.	168.	1076.	403.	1409.	34.	68.	942.	5222.

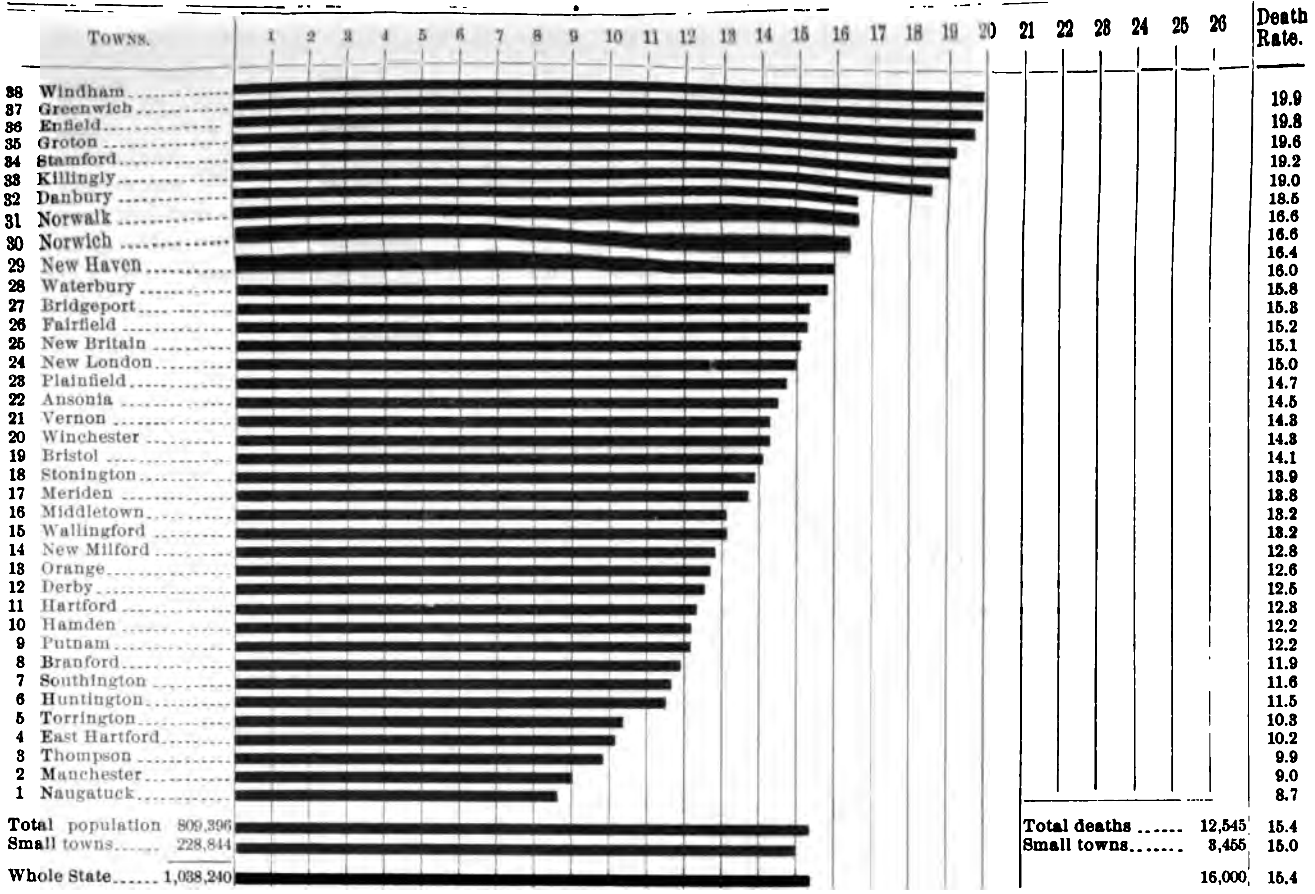
DEATH RATE, 1908.

DIAGRAM C, SHOWING THE NUMBER OF DEATHS TO EACH 1,000 OF THE POPULATION BY COUNTIES.



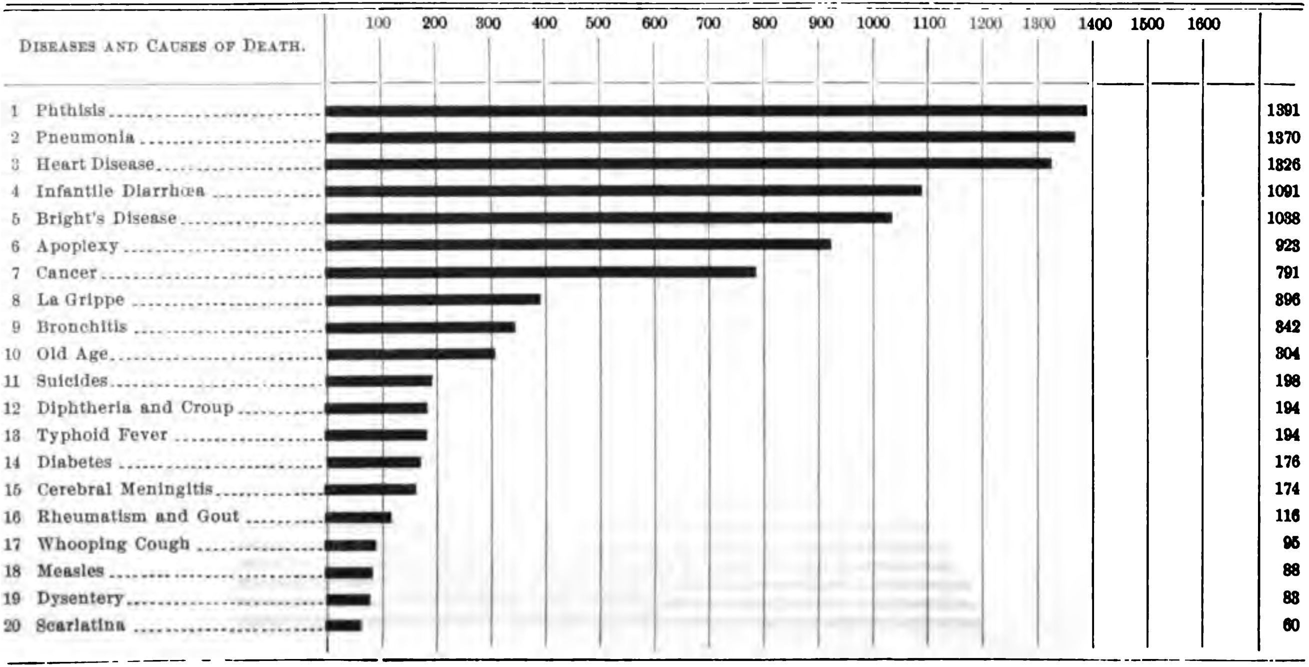
DEATH RATE, 1908.

DIAGRAM D, SHOWING THE RATE TO EACH 1,000 OF THE POPULATION IN EVERY TOWN OF OVER 5,000 INHABITANTS, AND OF THE REMAINDER OF THE STATE.



DEATH RATE, 1908.

DIAGRAM E, EXHIBITING THE COMPARATIVE MORTALITY BY ABSOLUTE NUMBERS FROM TWENTY OF THE PROMINENT CAUSES OF DEATH IN CONNECTICUT IN 1908.



STATEMENT OF BIRTHS FOR THE TEN YEARS ENDING DECEMBER 31, 1908.

COUNTIES.	SEX.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	Total for 10 yrs.
Hartford	Male	2,205	2,202	2,272	2,279	2,436	2,571	2,627	2,816	2,874	3,057	25,337
	Female	2,154	2,117	2,034	2,140	2,268	2,468	2,557	2,588	2,788	2,881	23,996
	Not stated	24	13	8	4	5	1	10	15	11	13	104
	Total	4,383	4,332	4,314	4,423	4,709	5,040	5,194	5,419	5,673	5,951	49,437
New Haven	Male	3,611	3,486	3,556	3,703	3,684	3,898	3,986	4,226	4,485	4,570	39,205
	Female	3,352	3,367	3,239	3,435	3,446	3,751	3,691	3,929	4,196	4,283	36,688
	Not stated	21	9	5	3	10	5	12	34	19	14	132
	Total	6,984	6,862	6,800	7,141	7,140	7,654	7,689	8,189	8,700	8,867	76,025
New London	Male	901	887	906	963	962	1,039	947	1,043	1,001	985	9,634
	Female	858	872	791	901	927	933	996	965	950	996	9,189
	Not stated	11	2	1	2	4	2	2	22	9	6	61
	Total	1,770	1,761	1,698	1,866	1,893	1,974	1,945	2,030	1,960	1,987	18,884
Fairfield	Male	2,155	2,084	2,058	2,229	2,251	2,295	2,291	2,696	2,831	2,864	23,754
	Female	1,966	1,965	1,933	1,981	2,153	2,190	2,216	2,444	2,668	2,750	22,269
	Not stated	23	10	11	15	1	18	26	30	66	8	208
	Total	4,144	4,059	4,002	4,225	4,405	4,503	4,533	5,170	5,565	5,622	46,231
Windham	Male	496	519	521	512	519	493	527	477	515	574	5,153
	Female	481	495	471	517	511	510	477	481	481	517	4,941
	Not stated	3	1	1	1	......	......	2	1	......	2	11
	Total	980	1,015	993	1,030	1,030	1,003	1,006	959	996	1,093	10,105
Litchfield	Male	696	665	643	731	699	728	761	717	783	811	7,239
	Female	645	678	629	631	655	664	691	701	760	769	6,823
	Not stated	4	1	2	3	5	2	1	21	18	5	57
	Total	1,345	1,344	1,274	1,365	1,359	1,394	1,453	1,439	1,561	1,585	14,119
Middlesex	Male	433	360	394	352	353	399	468	490	488	514	4,251
	Female	340	348	340	340	360	420	440	416	443	495	3,937
	Not stated	2	......	3	2	2	1	......	1	8	3	22
	Total	775	708	737	694	715	820	908	907	939	1,012	8,210
Tolland	Male	242	219	261	224	247	230	286	268	262	281	2,520
	Female	230	265	213	248	253	245	258	255	282	286	2,530
	Not stated	2	......	2	......	......	1	4	5	7	10	31
	Total	474	484	476	472	500	476	548	528	551	577	5,081
Totals for the State	Male	10,739	10,422	10,611	10,993	11,151	11,653	11,893	12,733	13,244	13,656	117,093
	Female	10,026	10,102	9,650	10,193	10,573	11,181	11,321	11,779	12,568	12,977	110,873
	Not stated	90	36	33	30	27	30	57	129	133	61	626
Grand Total	....	20,855	20,560	20,294	21,216	21,751	22,864	23,271	24,641	25,945	26,694	228,092

STATEMENT OF DEATHS FOR THE TEN YEARS ENDING DECEMBER 31, 1908.

COUNTIES.	SEX.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	Total for 10 yrs.
Hartford	Male	1,618	1,770	1,631	1,524	1,710	1,793	1,876	1,950	1,923	1,774	17,569
	Female	1,598	1,648	1,454	1,367	1,543	1,574	1,612	1,649	1,721	1,497	15,663
	Not stated	1	......	1	......	......	......	......	......	......	......	2
	Total	3,217	3,418	3,086	2,891	3,253	3,367	3,488	3,599	3,644	3,271	33,234
New Haven	Male	2,131	2,535	2,360	2,290	2,389	2,502	2,580	2,763	2,753	2,633	24,936
	Female	2,020	2,238	2,095	2,078	2,160	2,117	2,268	2,394	2,515	2,237	22,122
	Not stated	2	......	2	3	......	1	......	1	......	1	10
	Total	4,153	4,773	4,457	4,371	4,549	4,620	4,848	5,158	5,268	4,871	47,063
New London	Male	633	774	738	711	767	798	756	794	858	737	7,566
	Female	637	812	695	626	724	701	718	699	744	729	7,085
	Not stated	......	1	......	2	1	3	2	1	......	......	10
	Total	1,270	1,587	1,433	1,339	1,492	1,502	1,476	1,494	1,602	1,466	14,661
Fairfield	Male	1,548	1,709	1,651	1,664	1,734	1,791	1,831	1,949	2,186	1,876	17,939
	Female	1,343	1,510	1,374	1,424	1,535	1,536	1,619	1,628	1,731	1,687	15,387
	Not stated	1	1	2	......	......	1	3	1	1	......	10
	Total	2,892	3,220	3,027	3,088	3,269	3,328	3,453	3,578	3,918	3,563	33,336
Windham	Male	382	453	361	384	391	387	409	390	367	370	3,894
	Female	414	457	371	350	354	394	413	401	377	376	3,907
	Not stated	......	......	......	......	1	......	......	......	......	1	2
	Total	796	910	732	734	746	781	822	791	744	747	7,803
Litchfield	Male	476	601	503	477	486	493	535	506	550	511	5,138
	Female	464	562	494	407	428	442	500	508	516	430	4,751
	Not stated	......	......	......	......	......	......	......	......	......	......	......
	Total	940	1,163	997	884	914	935	1,035	1,014	1,066	941	9,889
Middlesex	Male	386	418	373	375	386	425	429	404	420	393	4,009
	Female	349	424	379	338	439	368	377	352	453	369	3,848
	Not stated	......	......	......	......	1	......	1	......	......	......	2
	Total	735	842	752	713	826	793	807	756	873	762	7,859
Tolland	Male	183	220	201	171	229	187	189	176	180	191	1,927
	Female	195	235	170	195	212	198	180	200	195	188	1,968
	Not stated	......	......	1	......	......	......	......	......	......	......	1
	Total	378	455	372	366	441	385	369	376	375	379	3,896
Totals for the State	Male	7,357	8,480	7,818	7,596	8,092	8,376	8,605	8,932	9,237	8,485	82,978
	Female	7,020	7,886	7,032	6,785	7,395	7,330	7,687	7,831	8,252	7,513	74,731
	Not stated	4	2	6	5	3	5	6	3	1	2	37
Grand Total	....	14,381	16,368	14,856	14,386	15,490	15,711	16,298	16,766	17,490	16,000	157,746

CONSUMPTION.

The number of deaths reported from pulmonary tuberculosis was 1391 as compared with 1527 in 1907 and 1369 in 1906. This gives a death-rate of 13.3 per 10,000 of population for the year 1908, which is the lowest yet recorded.

The chart given below shows the general decline in the death-rate from this disease during the past twenty-six years, and the tables on the following pages give the deaths by ages and sexes; also the mortality in the State and various Counties since 1879.

CHART—SHOWING DEATHS IN CONNECTICUT FROM CONSUMPTION PER 10,000 POPULATION FOR 26 YEARS, 1883–1908.

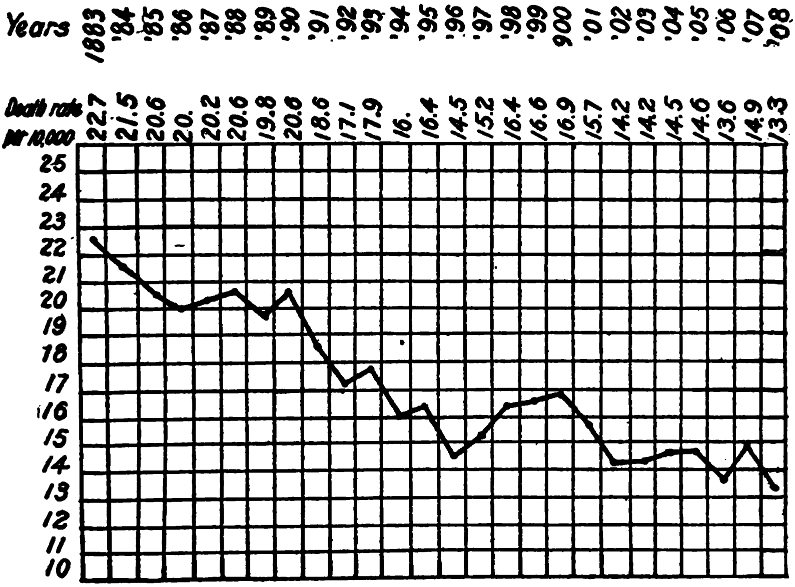


TABLE XXXI.—SHOWING THE DEATHS IN CONNECTICUT FROM CONSUMPTION BY AGES AND BY SEX OF DECEDENTS FOR 15 YEARS.

Years.	Under 1 year.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Males.	Females.	Total.
1894	22	10	12	125	425	253	200	118	92	46	11	..	674	640	1,314
1895	26	22	12	145	417	294	173	120	80	53	15	1	698	660	1,358
1896	24	25	10	108	358	278	170	115	65	60	13	1	620	607	1,227
1897	32	19	9	129	390	305	172	110	71	58	11	..	686	620	1,306
1898	32	27	8	123	481	338	185	112	67	32	13	..	757	681	1,438
1899	27	36	14	133	439	339	192	113	93	52	12	1	756	695	1,451
1900	31	32	12	151	424	379	213	132	91	57	16	1	833	706	1,539
1901	36	28	19	124	423	332	211	147	91	44	12	..	812	655	1,467
1902	20	18	17	137	375	317	191	135	97	39	10	..	748	608	1,356
1903	21	24	19	139	366	330	192	129	84	44	15	1	747	617	1,364
1904	24	23	19	169	385	351	202	110	90	33	5	1	774	638	1,412
1905	32	32	6	134	405	358	226	135	64	50	10	1	817	642	1,453
1906	22	29	17	136	393	354	187	112	64	49	6	..	771	598	1,369
1907	17	27	17	133	420	399	246	125	93	41	9	..	834	693	1,527
1908	19	21	10	140	386	349	225	126	72	35	6	2	802	589	1,391
	385	373	201	2,026	6,087	4,976	2,985	1,839	1,214	713	164	9	11,323	9,649	20,972

TABLE XXXII.—SHOWING DEATHS FROM CONSUMPTION IN CONNECTICUT PER 10,000 POPULATION, FOR 30 YEARS, 1879–1908.

Years.	Population.	Deaths.	Death-rate per year.	Per five years.	Deaths from all Causes.	Percentage of Deaths from Consumption to total Deaths.
1879	614,177	1,307	21.2	21.7	9,394	13.9
1880	622,700	1,327	21.1		10,408	12.7
1881	635,055	1,404	22.1		10,907	12.8
1882	647,410	1,455	22.4		11,622	12.5
1883	659,765	1,505	22.7		11,943	12.6
1884	672,120	1,446	21.5	21.	11,351	12.7
1885	684,475	1,409	20.6		12,033	11.7
1886	696,830	1,395	20.0		11,616	12.0
1887	709,185	1,435	20.2		12,385	11.5
1888	721,540	1,498	20.6		12,980	11.5
1889	733,895	1,465	19.8	18.8	12,529	11.6
1890	746,258	1,541	20.6		13,665	11.2
1891	762,474	1,424	18.6		14,385	9.8
1892	778,690	1,386	17.1		15,170	9.1
1893	794,906	1,426	17.9		14,901	9.5
1894	811,116	1,314	16.0	16.	13,699	9.5
1895	827,326	1,358	16.4		14,546	9.3
1896	843,536	1,227	14.5		15,025	8.1
1897	859,746	1,306	15.2		13,915	9.3
1898	875,960	1,438	16.4		14,170	10.1
1899	892,196	1,451	16.6	15.9	14,381	10.0
1900	908,420	1,539	16.9		16,368	9.4
1901	928,000	1,467	15.7		14,856	9.8
1902	948,000	1,356	14.2		14,386	9.4
1903	956,748	1,364	14.2		15,490	8.8
1904	973,177	1,412	14.5	14.1	15,711	8.9
1905	989,570	1,453	14.6		16,298	8.9
1906	1,005,894	1,369	13.6		16,766	8.1
1907	1,021,930	1,527	14.9		17,490	8.7
1908	1,038,240	1,391	13.3		16,000	8.6

TABLE XXXIII.—CONSUMPTION: MORTALITY BY COUNTIES—1879–1908.

YEAR.	HARTFORD COUNTY.			YEAR.	NEW HAVEN COUNTY.			YEAR.	NEW LONDON COUNTY.			YEAR.	FAIRFIELD COUNTY.		
	Population.	Deaths.	Death-rate per 1000.		Population-	Deaths.	Death-rate per 1000.		Population.	Deaths.	Death-rate per 1000		Population.	Deaths.	Death-rate per 1000.
1879....	123,749	255	2.06	1879...	153,000	330	2.15	1879...	72,474	172	2.37	1879...	110,360	220	1.99
1880....	125,387	285	2.27	1880...	156,526	335	2.14	1880...	73,137	208	2.84	1880...	112,044	211	1.88
1881....	127,566	296	2.32	1881...	161,779	404	2.49	1881...	73,486	195	2.65	1881...	115,847	215	1.85
1882....	129,745	331	2.55	1882...	167,032	408	2.44	1882...	73,835	190	2.57	1882...	119,650	221	1.84
1883....	131,925	316	2.31	1883...	172,285	403	2.33	1883...	74,184	206	2.77	1883...	123,453	254	2.05
1884....	134,104	278	2.08	1884...	177,538	422	2.37	1884...	74,533	177	2.37	1884...	127,256	287	2.25
1885....	136,283	291	2.13	1885...	182,792	419	2.29	1885...	74,882	197	2.63	1885...	131,059	240	1.83
1886....	138,463	301	2.17	1886...	188,045	405	2.15	1886...	75,231	188	2.49	1886...	134,862	231	1.71
1887....	140,642	295	2.09	1887...	193,298	456	2.35	1887...	75,580	164	2.16	1887...	138,665	233	1.68
1888....	142,821	325	2.27	1888...	198,551	458	2.30	1888...	75,929	146	1.92	1888...	142,468	286	2.00
1889....	145,000	285	1.27	1889...	203,804	423	2.07	1889...	76,278	152	1.99	1889...	146,271	291	1.98
1890....	147,180	297	2.01	1890...	209,058	488	2.33	1890...	76,634	168	2.19	1890...	150,081	282	1.87
1891....	152,003	330	2.17	1891...	215,068	419	1.94	1891...	77,246	138	1.78	1891...	153,493	238	1.61
1892....	156,827	292	1.86	1892...	221,079	384	1.73	1892...	77,858	143	1.83	1892...	156,905	269	1.71
1893....	161,650	317	1.96	1893...	227,089	384	1.69	1893...	78,470	152	1.93	1893...	160,370	284	1.77
1894....	166,474	250	1.50	1894...	233,100	429	1.84	1894...	79,082	143	1.80	1894...	163,729	237	1.44
1895....	171,297	264	1.54	1895...	239,110	417	1.74	1895...	79,694	149	1.86	1895...	167,141	291	1.74
1896....	176,121	231	1.31	1896...	245,121	391	1.59	1896...	80,306	122	1.51	1896...	170,553	251	1.47
1897....	180,944	309	1.70	1897...	251,131	404	1.60	1897...	80,918	125	1.54	1897...	173,965	257	1.47
1898....	185,768	275	1.48	1898...	257,142	466	1.81	1898...	81,530	120	1.47	1898...	177,377	307	1.73
1899....	190,591	324	1.69	1899...	263,152	437	1.66	1899...	82,142	112	1.36	1899...	180,789	299	1.65
1900....	195,415	315	1.61	1900...	269,163	484	1.79	1900...	82,758	144	1.74	1900...	184,203	309	1.67
1901....	200,238	294	1.46	1901...	275,173	446	1.62	1901...	83,370	126	1.51	1901...	187,615	330	1.75
1902....	205,062	242	1.13	1902...	281,184	450	1.60	1902...	83,982	132	1.57	1902...	191,027	283	1.37
1903....	209,885	282	1.34	1903...	287,094	417	1.45	1903...	84,595	138	1.63	1903...	194,439	289	1.48
1904....	214,698	270	1.25	1904...	293,200	443	1.51	1904...	85,211	119	1.43	1904...	197,848	311	1.57
1905....	219,626	300	1.36	1905...	299,225	427	1.42	1905...	85,894	116	1.35	1905...	201,261	336	1.67
1906....	224,451	259	1.15	1906...	305,221	438	1.43	1906...	86,573	113	1.30	1906...	204,672	304	1.48
1907....	229,286	324	1.41	1907...	311,249	488	1.56	1907...	87,044	123	1.41	1907...	208,084	358	1.72
1908....	234,123	270	1.15	1908...	317,263	443	1.39	1908...	87,688	115	1.31	1908...	211,529	316	1.49
Av. Death-rate for 30 years			1.75				1.89				1.90				1.72

TABLE XXXIII. CONTINUED.—CONSUMPTION: MORTALITY BY COUNTIES—1879-1908.

YEAR.	WINDHAM COUNTY.			YEAR.	LITCHFIELD COUNTY.			YEAR.	MIDDLESEX COUNTY.			YEAR.	TOLLAND COUNTY.		
	Population.	Deaths.	Death-rate per 1000.		Population.	Deaths.	Death-rate per 1000.		Population.	Deaths.	Death-rate per 1000.		Population.	Deaths.	Death-rate per 1000.
1879....	43,324	98	2.26	1879...	51,706	83	1.60	1879...	35,640	83	2.32	1879...	23,899	56	2.34
1880....	43,857	94	2.14	1880...	52,043	100	1.92	1880...	35,587	56	1.57	1880...	24,112	28	1.16
1881....	43,987	107	2.43	1881...	52,193	75	1.43	1881...	35,980	73	2.02	1881...	24,209	39	1.61
1882....	44,117	76	1.72	1882...	52,343	82	1.56	1882...	36,373	89	2.44	1882...	24,900	58	2.38
1883....	44,247	104	2.35	1883...	52,493	75	1.42	1883...	36,766	117	3.18	1883...	24,403	42	1.72
1884 ...	44,377	75	1.69	1884...	52,643	85	1.61	1884...	37,159	88	2.36	1884...	24,500	39	1.59
1885....	44,507	79	1.77	1885...	52,793	88	1.66	1885...	37,552	65	1.73	1885...	24,597	43	1.74
1886....	44,637	62	1.38	1886...	52,943	66	1.24	1886...	37,945	88	2.31	1886...	24,694	23	.93
1887....	44,767	81	1.80	1887...	53,093	87	1.63	1887...	38,338	73	1.90	1887...	24,791	39	1.57
1888....	44,897	77	1.71	1888...	53,243	77	1.44	1888...	38,731	71	1.83	1888...	24,888	51	2.04
1889....	45,027	83	1.84	1889...	53,393	92	1.72	1889...	39,124	83	2.12	1889...	24,985	50	2.00
1890....	45,158	89	1.97	1890...	53,542	84	1.56	1890...	39,524	90	2.27	1890...	25,081	46	1.83
1891....	45,328	92	2.02	1891...	54,555	77	1.41	1891...	39,747	79	1.98	1891...	25,026	47	1.87
1892....	45,498	87	1.91	1892...	55,568	81	1.45	1892...	39,970	103	2.57	1892...	24,971	27	1.08
1893....	45,668	74	1.62	1893...	56,581	66	1.16	1893...	40,193	84	2.08	1893...	24,916	44	1.76
1894....	45,838	79	1.72	1894...	57,594	73	1.26	1894...	40,416	70	1.73	1894...	24,861	30	1.20
1895....	46,008	69	1.49	1895...	58,607	55	.93	1895...	40,639	80	1.96	1895...	24,806	33	1.33
1896....	46,178	80	1.73	1896...	59,620	61	1.02	1896...	40,862	59	1.44	1896...	24,751	32	1.29
1897....	46,348	73	1.57	1897...	60,633	61	1.00	1897...	41,085	42	1.02	1897...	24,696	35	1.41
1898....	46,518	82	1.76	1898...	61,646	83	1.34	1898...	41,308	78	1.88	1898...	24,641	27	1.09
1899....	46,688	76	1.62	1899...	62,659	98	1.56	1899...	41,531	69	1.66	1899...	24,586	36	1.46
1900....	46,861	86	1.83	1900...	63,672	92	1.44	1900...	41,760	69	1.65	1900...	24,523	40	1.63
1901....	47,031	70	1.48	1901...	64,685	88	1.36	1901...	41,983	86	2.04	1901...	24,468	27	1.10
1902....	47,201	58	1.44	1902...	65,698	80	1.21	1902...	42,207	73	1.72	1902...	24,413	28	1.14
1903....	47,371	67	1.41	1903...	66,711	67	1.00	1903...	42,430	73	1.72	1903...	24,470	31	1.26
1904....	47,543	72	1.51	1904...	67,721	93	1.37	1904...	42,653	77	1.80	1904...	24,303	27	1.11
1905....	47,714	74	1.55	1905...	68,735	84	1.22	1905...	42,867	91	2.12	1905...	24,248	25	1.03
1906....	47,888	72	1.50	1906...	69,749	70	1.00	1906...	43,102	89	2.06	1906...	24,198	24	.99
1907....	48,054	49	1.01	1907...	70,755	89	1.25	1907...	43,319	73	1.68	1907...	24,139	23	.95
1908....	48,223	67	1.88	1908...	71,779	90	1.25	1908...	43,548	68	1.56	1908...	24,087	22	.91
Av. Death-rate for 30 years			1.72				1.37				1.95				1.45

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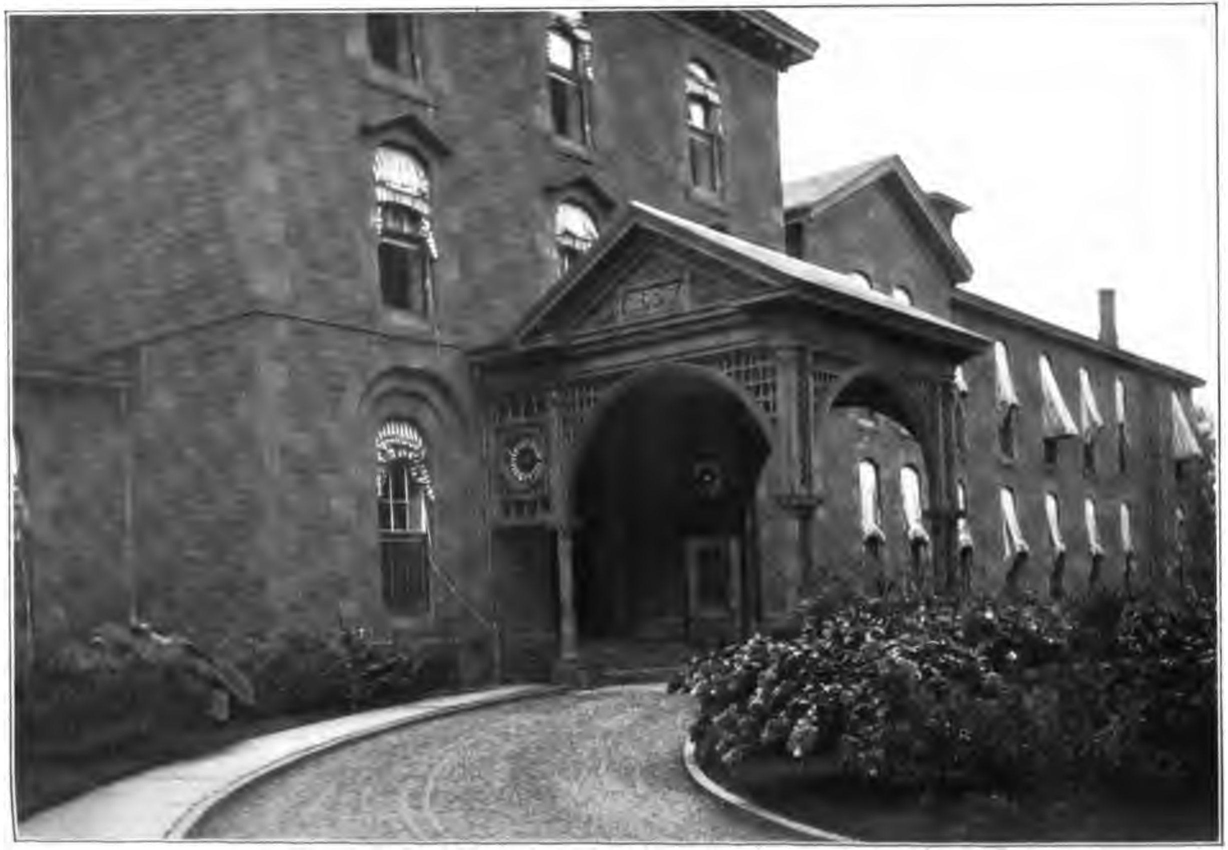

HARTFORD HOSPITAL -- Hudson Street Entrance.

54TH ANNUAL REPORT

OF THE

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OF THE

HARTFORD HOSPITAL

INCLUDING THE

TWENTY-FIFTH ANNUAL REPORT

OF THE

OLD PEOPLE'S HOME

AND THE

THIRTY-SECOND ANNUAL REPORT

OF THE

HARTFORD HOSPITAL TRAINING SCHOOL FOR NURSES

HARTFORD PRESS:
THE CASE, LOCKWOOD & BRAINARD COMPANY
1909

11

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HARTFORD HOSPITAL

ACTS OF LEGISLATION.

Act Incorporating Hartford Hospital.

Resolved by the Senate and House of Representatives in General Assembly convened:

Section 1. That David Watkinson, Ebenezer Flower, A. S. Beckwith, S. S. Ward, A. W. Butler, A. M. Collins, Wm. T. Lee, Job Allyn, Samuel Colt, James B. Crosby, Albert Day, Chester Adams, James G. Bolles, George Beach, Thomas Smith, Jonathan Goodwin, A. W. Birge, Lucius Barbour, and Charles T. Hillyer, and all such persons as are from time to time associated with them, for the purpose of establishing and maintaining a hospital in the city of Hartford, and their successors, be, and they hereby are, incorporated for said purpose, and made a body corporate and politic, by the name of the Hartford Hospital, and by that name shall be capable of suing and being sued, pleading and being impleaded, and may purchase, take, receive, hold, sell, and convey estate, real and personal, to such an amount as may be necessary for the purposes of said corporation; may have a common seal, and the same may alter and change at pleasure, and may make and execute such by-laws and regulations, not contrary to the laws of this State or of the United States, as shall be deemed necessary for the well-ordering and conducting the concerns of said corporation.

Sec. 2. That said corporation shall be governed by the following articles:

Article 1. This corporation shall be called the Hartford Hospital. Persons contributing for the use of the corporation at any one time the sum of fifty dollars shall be members for life. Persons contributing the sum of five hundred dollars shall be vice-presidents for life, and also directors for life; those contributing two hundred dollars shall be directors for life; those twenty-five dollars shall be members for five years, and those ten dollars shall be members for one year.

Art. 2. In order the better to carry into effect the object of the said corporation, the members thereof shall, at an annual meeting, to be held at such time and place as the by-laws of the said corporation shall direct and appoint, elect from their own number, by ballot, and by a majority of the votes given at such election, twelve persons as directors of the said corporation; and the persons so elected, together with the mayor of the city of Hartford for the time being, shall constitute a board of directors. The directors so elected shall hold their offices for one year, and until others are elected in their places. In case of any vacancy in the board the remainder of the directors shall have power to fill such vacancy until the next election.

Art. 3. The board of directors shall, annually, as soon as may be convenient after the said annual election, elect by ballot from among their own number a president, a vice-president, and shall also elect a secretary and treasurer, who shall hold their offices for one year, and until others are elected in their stead. But as many directors may be chosen as there may be directors by subscription.

Art. 4. The said board of directors shall have power to manage and conduct all the business and concerns of the corporation, and to make such laws as may be necessary for the management and disposition of the estate and concerns of the corporation, and to appoint such officers and servants as they may deem necessary. The medical officers, including all attending and consulting physicians and surgeons, shall be appointed annually. Vacancies occurring before the expiration of the year from the time of any appointment shall be filled by the directors as soon as the same can conveniently be done.

Art. 5. A majority of the corporators shall call the first meeting for the election of officers at such time and place in the city of Hartford as they shall appoint, giving three days' notice thereof by publishing the same in the daily papers of the city; and the annual meeting of said corporation shall be held at such time and place and on such notice as shall be fixed by the by-laws of said corporation.

Art. 6. This act may be altered, amended, or repealed, by the General Assembly.

Approved, May Session, 1854.

Resolution Amending the Charter of the Hartford Hospital.

Resolved, That additional members of said corporation may hereafter be elected at any annual meeting by a two-thirds vote of those present without the payment of any sum of money on the part of members so elected.

Approved, January Session, 1881.

Amendment of the Charter of the Hartford Hospital.

Resolved by the Senate and House of Representatives in General Assembly convened:

Section 1. That, in addition to the powers already conferred upon the Hartford Hospital, said corporation are hereby authorized to establish, in connection with the present hospital buildings, and upon the hospital grounds, or elsewhere, an Old People's Home, or a department or home for the accommodation, support, and maintenance of such aged and infirm persons as shall, from time to time, be admitted to the comforts and privileges of such department or home, and erect the necessary buildings therefor, and sustain the said Home with such funds and means as shall be given for that purpose, or paid by or for the benefit of the persons admitted to said Home. The board of directors of said Hartford Hospital shall have the power to make and execute any and all such by-laws, rules, and regulations in relation to such department or home, and the management of the same, and the funds pertaining thereto, and generally all the concerns of said department, not contrary to the laws of this State or of the United States, as shall be deemed necessary or proper for the well-ordering and conducting the concerns of said department, and the same to repeal or change at pleasure; and may appoint, if deemed expedient, a board of managers for said department, with such powers as they shall deem proper, and also such officers and servants as they may deem necessary.

All the rights and privileges conferred by the charter of the Hartford Hospital upon persons contributing for the use of said corporation shall be had and enjoyed by persons and parties limiting their contributions to the use of the department for the aged and the infirm as fully and to the same extent as if no such limitation was connected with such contribution.

All the money and funds already, or which shall be, given or contributed for the uses and purposes of the Hartford Hospital shall be confined to and used for the benefit of the hospital department, and all moneys and funds in any way given or contributed for the aged and infirm department shall be held and used exclusively for that department, under such rules and regulations as may be adopted in relation to a division of the common expenses pertaining to the two departments, which cannot be kept separately and accurately divided.

This department of the Hartford Hospital shall be known as the Old People's Home, and any and all moneys, gifts, legacies, devises, bequests, or other contributions given to the Old People's Home, or for its uses, or to the Hartford Hospital, or to any other trustee or trustees, for or in trust for the use of the Old People's Home, shall be good and effectual, and shall be for the use of this department for the aged and infirm created under this act.

SEC. 2. This resolution may be altered, amended, or repealed, at the pleasure of the General Assembly.

Approved, June 19, 1873.

RESOLUTION AMENDING THE CHARTER OF THE HARTFORD HOSPITAL.

Resolved by this Assembly:

That the resolution incorporating the Hartford Hospital, passed 1854, be and the same is hereby amended by striking out Article 1 of Section 2 and inserting in lieu thereof the following: "This corporation shall be called the Hartford Hospital; members of said corporation shall be such persons as are now members thereof and those who shall hereafter be elected to membership under the provisions of the resolution amending the charter of said corporation, approved March 1, 1881."

Approved, April 14, 1909.

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ROBERT L. ROWLEY, M.D.

Physician to the Old People's Home.

JOHN B. WATERS, M.D.

HOSPITAL EXECUTIVE STAFF.

Superintendent.

APPLETON W. SMITH, M.D.

Principal of Training School.

Miss LAUDER SUTHERLAND.

Assistant to the Principal.

Miss LIZZIE L. GOEPPINGER.

Night Supervisor.

Miss EVA J. EDWARDS.

Pharmacist.

JAMES J. DUNN.

Clerks.

JOHN E. FAY,
JOHN J. ROGERSON,
Miss MAY CONWAY.

Steward.

WILLIAM J. DEVINE.

Housekeeper.

Mrs. JOSEPHINE SPERRY.

RESIDENT MEDICAL AND SURGICAL STAFF.

House Physician.

WILBUR LESLIE LE CRON, M.D.

House Surgeon.

CARL HERBERT BRYANT, M.D.

Assistant House Surgeons.

DWIGHT WALLACE TRACY, M.D.,
EDWARD ADAMS DEMING, M.D.

Assistant House Physicians.

WILFRED ELLSWORTH ROUNSEVILLE, M.D.,
JENNINGS CRAWFORD, M.D.,
PHILIP CHARLES JEANS, M.D.

TREASURER'S REPORT

HARTFORD HOSPITAL

Close of Fiscal Year, September 30, 1909.

RECEIPTS.

Balance cash from 1908 report, including unexpended income, account trust funds,		$10,047.75
Bequest of Miss Mary Jane Blackman, Hartford, net,	$1,963.87	
Mrs. Alice A. Hall, Colebrook, one-fifth of residuum,	5,881.11—	7,844.98
Edwin D. Judd, Hartford, for permanent fund,		5,000.00
Donation of Brown, Thomson & Co., Hartford,	$40.00	
James J. Goodwin, "	1,000.00	
Louis B. Haas, "	10.00	
Mrs. Mary A. Hart, in memory of her husband, the late Henry Hart of Saybrook, Conn., by hands of Rev. Samuel Hart, D.D.,	1,070.22	
Joseph M. Merrow, Hartford,	25.00	
Edward M. Ney, "	25.00	
Mrs. Allen B. Talcott, New York,	13.00—	2,183.22
Donation of James J. Goodwin, Hartford, for Thanksgiving and Christmas,		25.00
Donation of Mrs. John H. Hall, Hartford, special for laboratory,		50.00
Christmas offering, Farmington Avenue Congregational Church Sunday School, Hartford,		7.96
Easter Offerings: Park Cong. Church, Hartford,	$45.15	
Farmington Avenue Congregational Church Sunday School, Hartford,	11.00	
A friend,	5.00	
A friend, special,	5.00—	66.15
Hospital Sunday contribution, Asylum Hill Congregational Church, Hartford,		93.95
Bank Stock, General Fund:		
3⅜% repaid on 100 shares capital stock of The Mercantile National Bank of Hartford, in liquidation,		337.50

Gas Stock, General Fund:		
Right of subscription on ⅛ share increased capital stock of the New Britain Gas Light Co., sold,		10.00
Bills Receivable, Real, Harriet Hall Fund,		3,000.00
" " " Keney Fund,		5,000.00
The Roland Mather Permanent Fund of the Hartford Hospital:		
Donation of Mrs. Charles P. Turner of Philadelphia, Penn.,		10,000.00
Charles F. Pond Free Bed Fund:		
Drawn from savings bank for subscription to 5 shares increased capital stock of the New Britain Gas Light Co.,		50.00
From Superintendent for care of patients and from all other sources at Hospital,		131,565.77
From City of Hartford for care of patients,		2,462.95
From State of Connecticut, annual appropriation to Hartford Hospital,		10,000.00
Interest, General Fund, net,		5,091.02
Permanent Funds,		17,917.46
Keney Fund Income,		2,132.44
Oliver Grant Terry and Amelia Smith Terry Fund Income,		10,825.01
The William B. McCray Fund Income,		1,760.24
Rents, Congress Street property, gross,	$768.00	
Hudson " " "	420.00	
Wooster " " net	156.18—	1,344.18
One-half net income from Wildwood Farm (O. P. Home received one-half),		439.83
From O. P. Home for its proportion of cost of annual reports and envelopes,		169.99
W. W. Jacobs & Co., temporary loans,		13,684.10
Pay-roll, reserve,		44.80
Tuberculosis Commission for Exhibit at Washington, D. C.,		74.75
Tubercular Hospital:		
Donation of Louis B. Haas, Hartford,	$10.00	
" " Needlework Guild of America,	5.00	
Contribution taken at Union Service of Sunday Schools of the Church of the Redeemer and Asylum Hill Congregational Church, Hartford,	19.16	
From Tuberculosis Commission for reimbursement,	30.60	
State of Connecticut, annual appropriation to Tubercular Hospital,	20,000.00	

City of Hartford, for board and care of patients,	10,404.09	
For board and care of patients, other than city patients,	14,722.64—	45,191.49
Tubercular Hospital:		
Special donation for amusement fund,		21.05
" " " lounging chairs,		100.00
" " " purpose yet to be decided upon,		1,000.00
Wildwood Farm:		
For rent of farm one year ended September 30, 1909,	$900.00	
For rent of pasture for season of 1909,	150.00	
Return insurance premium on portion of insurance canceled,	9.89—	1,059.89
Nurses Home Library Fund:		
Proceeds of "Fair" held in December, 1908,	$593.64	
Interest on deposit in bank,	9.12	
Drawn from savings bank for purchase of books, subscriptions to magazines, etc.,	83.70—	686.46
		$289,287.94

DISBURSEMENTS.

Paid for supplies, repairs, pay-rolls, etc., at Hospital,	$170,941.95
Disbursement of special donation for Thanksgiving and Christmas,	25.00
Gas Stock, General Fund:	
Subscription to one share increased capital stock of the New Britain Gas Light Co.,	10.00
Gas Stock, Charles F. Pond Free Bed Fund:	
Subscription to five shares increased capital stock of the New Britain Gas Light Co.,	50.00
Bonds, Harriet Hall Fund:	
Bought $3,000 Chicago, Burlington & Quincy R. R., 4s, March 1, 1958,	3,041.44
Bonds, The Roland Mather Permanent Fund of the Hartford Hospital:	
Bought $10,000 Chicago, Burlington & Quincy R. R., 4s, March 1, 1958,	10,128.33
Miscellaneous Stock, Oliver Grant Terry and Amelia Smith Terry Fund:	
Subscription to two shares increased capital stock of The Hartford Electric Light Co.,	200.00

Insurance on Hospital buildings and contents for term policies, so that one-third of insurance will expire annually,	$1,500.17	
On ice house, one year,	6.45	
On plate glass window in new operating room, one year,	2.10—	1,508.72
Congress Street property, repairs, etc.,		154.62
Hudson " " " "		102.52
Oliver Grant Terry and Amelia Smith Terry Fund Income, High Street property, repairs, etc.,		277.95
Keney Fund Income, for care of patients,		1,085.25
Lying-in ward, The William B. McCray Fund:		
Expense of maintenance of ward,		1,661.50
Deposited in savings bank for account of the Nurses' Home Library Fund,		438.31
W. W. Jacobs & Co., temporary loans repaid,		13,684.10
Heating Plant, for materials, labor, etc., balance,		16,845.58
Disbursement of special Easter Offering,		5.00
" for account of laboratory ($50 donated),		50.32
" for account of clinic room (expense provided for),		1,528.76
" for account of Tuberculosis Exhibit at Washington, D. C.,		74.75
Tubercular Hospital:		
For supplies, repairs, pay-rolls, etc.,		46,904.70
Tubercular Hospital:		
Disbursed on account of amusement fund,		11.60
" " " ". special fund for lounging chairs,		86.23
Wildwood Farm:		
For insurance on buildings and contents for term policies, so that one-third of insurance will expire annually,	$30.24	
Rent of pasture for season of 1908,	150.00	
One-half net income to Hartford Hospital,	439.83	
One-half net income to Old People's Home,	439.82—	1,059.89
Nurses' Home Library Fund, for books purchased and subscriptions to magazines, etc.,		248.15
Expense: Cedar Hill Cemetery, for care of Junius S. Morgan lot and monument,	$58.50	
Fidelity and Deposit Company of Maryland, for premium on bond on Treasurer,	30.00	
Telephone, one year,	25.00	
Annual reports and envelopes,	694.35	

Stationery, printing, etc.,	122.20	
Auditing accounts,	25.00	
Salary of Treasurer, one year,	700.00	
Miscellaneous disbursements,	250.00	
Incidentals,	60.97—	1,966.02
Balance Cash:		
The William B. McCray Fund Income,	$1,645.61	
Orthopedic Fund,	149.64	
Edwin D. Judd Fund uninvested (received September 30, 1909),	5,000.00	
Keney Fund uninvested,	5,000.00	
Oliver Grant Terry and Amelia Smith Terry Fund uninvested,	695.39	
Wildwood Sanatorium:		
Balance of donation for amusement fund unexpended,	9.45	
Balance of donation for lounging chairs unexpended,	13.77	
Donation for purpose yet to be decided upon,	1,000.00	
Hartford Hospital, for general use,	3,683.39—	17,197.25
		$289,287.94

WARD W. JACOBS, *Treasurer.*

HARTFORD HOSPITAL

CLOSE OF FISCAL YEAR, SEPTEMBER 30, 1909.

RESOURCES.

GENERAL FUND

Bank Stocks

Shares.		Book Value.	Market Value.
25	Hartford National, Hartford,	$2,500.00	$3,500.00
110	National Exchange, "	5,500.00	7,150.00
2	Phœnix National, "	200.00	240.00
25	Second " New Haven,	2,500.00	4,850.00
60	First " Norwich,	6,000.00	5,100.00
50	Thames " "	5,000.00	8,250.00

Insurance Stocks

13	Connecticut Fire, Hartford,	1,450.00	4,030.00
10	Travelers, "	1,000.00	7,750.00

Railroad Stocks

40	Ft. Wayne & Jackson, preferred,	4,000.00	5,480.00
40	New London Northern,	4,000.00	7,800.00
25	New York, New Haven & Hartford,	2,500.00	4,250.00
115	Père Marquette, 1st pref. (par $11,500),	5,000.00	6,325.00

Miscellaneous Stocks

9	Adams Express Company,	900.00	2,025.00
177	Broad Brook Company,	4,425.00	4,956.00
5	Collins Company,	500.00	775.00
100	Farnham Type-setter Mfg. Co. (par $2,500),	1.00	1.00
5	New Britain Gas Light Co.,	100.00	200.00
32	Spring Grove Cemetery Ass'n (par $800),	1.00	1.00

Bonds

State of North Carolina, 4s, July 1, 1910,	1,650.00	1,650.00
Detroit, Grand Rapids & Western R. R., 4s, April 1, 1946,	8,000.00	7,440.00

	Book Value.	Market Value.
Keokuk & Des Moines' Ry., 5s, Oct. 1, 1923, .	30,000.00	32,100.00
Northern Pacific-Gt. Northern, C., B. & Q., Coll., 4s, July 1, 1921 (par value $25,000),	24,500.00	25,000.00
Père Marquette R. R., Deb., 6s, July 1, 1912, .	5,000.00	4,800.00
Adams Express Co., Coll. Trust, 4s, June 1, 1947,	1,500.00	1,395.00
Bills Receivable, Real, ...	250.00	250.00

Real Estate

Hospital building and grounds, . . .	1.00	1.00
Old People's Home, original lot, . . .	1.00	1.00
Brick house, 26 Hudson St., Hartford, . .	1.00	1.00
One-half interest in "Wildwood Farm," .	1.00	1.00
Double house, 37 and 39 Congress St., Hartford,	6,600.00	6,600.00
One-half interest in 51 and 51½ Wooster Street, Hartford, ...	2,500.00	2,500.00
Tubercular Hospital, O. D., ...	23,964.18	23,964.18
Workingmen's Free Bed Fund, . . .	11,010.88	11,010.88
Clinic room (expense provided for), . .	1,528.76	1,528.76
Balance cash, including unexpended income, account trust funds, ...	6,501.86	6,501.86

PERMANENT FUND

SAVINGS BANK DEPOSIT

Mechanics Savings Bank, Hartford, . .	490.00	490.00

TRUST FUNDS

F. A. and Martha W. Brown Fund

"The interest thereof only to be used."

BONDS

Columbus (Ohio) Gas Company, 5s, July 1, 1932,	25,000.00	23,750.00
Lehigh Valley Ry. of N. Y., 4½s, July 1, 1940,	9,000.00	9,720.00
Northern Pacific-Gt. Northern, C., B. & Q. Coll., 4s, July 1, 1921, ...	6,000.00	6,000.00

Citizens' Endowment Fund

BONDS

Keokuk & Des Moines Ry., 5s, Oct. 1, 1923, .	5,000.00	5,350.00
Missouri, Kansas & Eastern Railway, 5s, April 1, 1942, ...	20,000.00	23,000.00

Daniel P. Crosby Fund

"The interest to be used only for said institution."

BANK STOCKS

Shares.		Book Value.	Market Value.
38	Ætna National, Hartford, . . .	4,330.00	9,500.00
10	National Exchange, " . . .	670.00	650.00

Gurdon Fox Fund

"The income thereof to be applied from year to year to the uses and purposes of said hospital."

BONDS

	Book Value.	Market Value.
Cleveland, Cincinnati, Chicago & St. Louis Ry. (St. Louis Div., Collateral Trust), 4s, Nov. 1, 1990 (par $4,000), . . .	3,685.00	3,840.00
Lehigh Valley Ry. of N. Y., 4½s, July 1, 1940,	5,000.00	5,400.00

SAVINGS BANK DEPOSIT

	Book Value.	Market Value.
Mechanics Savings Bank, Hartford, . .	740.00	740.00

George Hall Fund, No. 1

"The income and interest only to be used for the benefit of the indigent of the City of Hartford."

BANK STOCKS

Shares.		Book Value.	Market Value.
84	American National, Hartford, ...	5,460.00	5,880.00
16	Phœnix " " . . .	2,060.00	1,920.00

George Hall Fund, No. 2

"The interest or income only to be expended for the benefit of the patients in the hospital."

INSURANCE STOCK

Shares.		Book Value.	Market Value.
30	Ætna, Hartford, ...	6,960.00	9,750.00

RAILROAD STOCKS

Shares.		Book Value.	Market Value.
100	Kansas City, St. Louis & Chicago, pref.,	11,000.00	13,500.00
40	Pittsburg, Ft. Wayne & Chicago, . .	5,540.00	6,960.00

Harriet Hall Fund

"The object of this fund is to provide for single women when sick, especially for those who have seen better days, are of respectable standing and unable to meet the expenses of their sickness."

Shares.	BANK STOCK	Book Value.	Market Value.
19	National Exchange, Hartford, . . .	1,280.00	1,235.00
	RAILROAD STOCK		
60	Ft. Wayne & Jackson, preferred, . .	5,520.00	8,220.00
	BONDS		
	Chicago, Burlington & Quincy R. R., General 4s, March 1, 1958, ...	3,000.00	3,000.00
	Chicago & Western Indiana R. R. Consolidated 4s, July 1, 1952, ...	9,000.00	8,550.00

Edwin D. Judd Fund

"The income only to be used for the purposes of the hospital."

Deposit in bank, ...	5,000.00	5,000.00

Keney Fund

"The interest and income whereof, only, is to be used and appropriated for the charitable and benevolent uses and purposes of said corporation, regard being made to individual cases of necessity."

BONDS		
Chicago, Peoria & St. Louis Ry., Prior Lien, 4½s, March 1, 1930 (par value $10,000),	9,900.00	8,500.00
Chicago & Western Indiana R. R., Consolidated, 4s, July 1, 1952 (par 5,000), . .	4,932.50	4,750.00
Northern Pacific-Gt. Northern, C., B. & Q. Coll., 4s, July 1, 1921, ...	5,000.00	5,000.00
Port Reading R. R., 5s, Jan. 1, 1941, . .	15,000.00	16,650.00
Chicago Railways Co., Series A, 4/5s, Feb. 1, 1927, ...	5,000.00	4,850.00
Chicago Railways Co., Series B, 4/5s, Feb. 1, 1927, ...	5,000.00	4,350.00
Deposit in bank, ...	5,000.00	5,000.00
SAVINGS BANK DEPOSIT		
Mechanics Savings Bank, Hartford, . .	167.50	167.50

Mary J. Keney Fund

"The income thereof only to be used and appropriated for the strictly benevolent and charitable purposes of said corporation."

BONDS

	Book Value.	Market Value.
Chicago & Western Ind. R. R., 6s, Dec. 1, 1932,	6,000.00	6,600.00
Missouri, Kansas & Eastern Railway, 5s, April 1, 1942, ...	4,000.00	4,600.00

SAVINGS BANK DEPOSIT

Mechanics Savings Bank, Hartford, . . .	200.00	200.00

The Roland Mather Permanent Fund of the Hartford Hospital

"The income thereof expended for the general uses and purposes of the hospital, to the end that the sick poor of the City of Hartford shall be relieved, so far as possible, by the instrumentalities of the hospital."

BONDS

Chicago, Burlington & Quincy R. R., General 4s, March 1, 1958, ...	10,000.00	10,000.00
Chicago & Western Indiana R. R., Consolidated 4s, July 1, 1952, ...	20,000.00	19,000.00

Junius S. Morgan Fund

For purposes of the hospital, conditioned that the Junius S. Morgan lot and monument in Cedar Hill Cemetery are maintained and kept in good order and condition.

BANK STOCKS

Shares.			
36	American National, Hartford, . . .	2,430.00	2,520.00
10	National Exchange, " . . .	630.00	650.00
4	Phœnix National, " . . .	496.00	480.00

INSURANCE STOCKS

7	Ætna, Hartford, ...	1,771.00	2,275.00
11	Hartford Fire, Hartford, ...	3,674.00	6,160.00
13	Travelers, Hartford, ...	1,953.00	10,075.00

RAILROAD STOCK

37	New York, New Haven & Hartford, .	7,845.85	6,290.00

BONDS

Canada Southern Railway, 6s, Jan. 1, 1913, .	1,000.00	1,050.00

SAVINGS BANK DEPOSIT

Society for Savings, Hartford, ...	385.15	385.15

Charles H. Northam Fund

"The annual income therefrom to be applied for the relief of hospital patients from the City and Town of Hartford."

BANK STOCKS

Shares.		Book Value.	Market Value.
5	Ætna National, Hartford,	575.00	1,250.00
30	National Exchange, Hartford,	2,010.00	1,950.00

INSURANCE STOCK

13	Connecticut Fire, Hartford,	1,507.50	4,030.00

SAVINGS BANK DEPOSIT

	Mechanics Savings Bank, Hartford,	40.00	40.00

Oliver Grant Terry and Amelia Smith Terry Fund

"The interest and income whereof is only to be used and appropriated for the charitable and benevolent uses and purposes of said corporation."

BANK STOCKS

Shares.			
90	Ætna National, Hartford,	18,000.00	22,500.00
10	Charter Oak National, Hartford,	1,200.00	1,400.00
50	Conn. River Banking Co., Hartford,	2,700.00	3,000.00
5	Farmers & Mechanics National, Hartford,	585.00	560.00
14	Merchants National, New York,	1,190.00	1,134.00

INSURANCE STOCKS

15	Ætna, Hartford,	4,575.00	4,875.00
10	Phœnix, Hartford,	2,450.00	2,730.00
40	Hartford Steam Boiler Insp. & Ins. Co.,	8,600.00	9,800.00

RAILROAD STOCKS

25	Chicago Great Western, pref. A,	1,375.00	775.00
25	Chicago, Ind. & Louisville, pref.,	2,000.00	1,500.00
19	Chicago, Mil. & St. Paul, common,	2,277.35	3,040.00
23	Chicago & Northwestern, common,	3,640.00	4,370.00
50	Cleve., Cin., Chi. & St. L., pref.,	5,446.88	5,350.00
54	Delaware & Hudson Company,	9,288.00	10,260.00
25	Minneapolis & St. Louis, pref.,	2,300.00	2,150.00
25	New York, New Haven & Hartford,	4,651.25	4,250.00
25	Norfolk & Western, adjust. pref.,	2,250.00	2,250.00
72	Pennsylvania,	4,788.00	5,220.00
150	Peoria & Bureau Valley,	30,000.00	27,750.00

MANUFACTURING STOCKS

30	Eagle Lock Company, Terryville,	1,800.00	2,250.00
50	Elgin National Watch Co., Chicago,	7,500.00	7,750.00

Shares.		Book Value.	Market Value.
57	Hartford Carpet Corporation, preferred,	6,270.00	7,011.00
57	" " " common .	2,280.00	3,990.00
23	Hartford Electric Light Company, . .	4,387.50	4,830.00

MISCELLANEOUS STOCKS

48	Adams Express Company, . . .	11,280.00	10,800.00
5	Hartford Golf Club Company, . .	200.00	250.00
5	New York Dock Company, preferred, .	200.00	410.00

BONDS

Brooklyn Union Elevated Ry., 5s, Feb. 1, 1950 (par $2,000), . . .	2,160.00	2,060.00
Chicago, Burlington & Quincy R. R., Deb. 5s, May 1, 1913 (par $9,000), . . .	9,720.00	9,270.00
Chicago & Erie R. R., 5s, May 1, 1982 (par $4,000), . . .	4,800.00	4,640.00
Chicago, Rock Island & Pacific R. R., General 4s, Jan. 1, 1988 (par $3,000), . . .	3,120.00	3,000.00
Chicago & Western Indiana R. R., Consolidated, 4s, July 1, 1952, ...	5,000.00	4,750.00
Cincinnati, Dayton & Ironton R. R., 5s, May 1, 1941 (par $3,000), . . .	3,420.00	3,180.00
Delaware & Hudson Company, Conv. Deb. 4s, June 15, 1916 (par $2,000), . . .	2,011.25	2,100.00
Indianapolis & St. Louis R. R. (Series A), 7s, July 1, 1919 (par $4,000), . . .	5,120.00	4,880.00
Kanawha & Michigan Ry., 4s, April 1, 1990 (par $1,000), . . .	940.00	950.00
New York, New Haven & Hartford R. R., Conv. Deb. 3½s, Jan. 1, 1956 (par $6,000),	6,634.07	6,480.00
New York, New Haven & Hartford R. R., Conv. Deb. 6s, Jan. 15, 1948, . . .	1,000.00	1,400.00
Northern Pacific-Gt. Northern, C., B. & Q., Coll., 4s, July 1, 1921 (par $6,000), . .	5,850.00	6,000.00
St. Louis & San Francisco Ry., General 5s, July 1, 1931 (par $2,000), . . .	2,240.00	2,220.00
Southern Railway, Consolidated 5s, July 1, 1994 (par $2,000), . . .	2,360.00	2,260.00
Adams Express Co., Coll. Trust, 4s, June 1, 1947,	10,000.00	9,300.00
International Silver Co., 6s, Dec. 1, 1948, .	1,000.00	1,100.00
New York Dock Co., 4s, Aug. 1, 1951 (par $500),	450.00	475.00
Real Estate, ...	12,000.00	12,000.00
Deposit in bank, ...	695.39	695.39

Henry I Wright Fund

"The income and interest thereof only to be used for the benefit of the poor who may need assistance at the hospital."

BANK STOCKS

Shares.		Book Value.	Market Value.
50	American National, Hartford, . .	3,250.00	3,500.00
10	Charter Oak " " . .	1,350.00	1,400.00

RAILROAD STOCKS

100	Erie & Pittsburg, ...	5,400.00	7,500.00

Samuel Barwick Beresford Free Bed Fund

"To establish a free bed therein; it being understood that the parish of Christ Church, Hartford, shall have first privilege of nominating a beneficiary of the bed."

BONDS

Hartford & Conn. Western R. R., 4½s, July 1, 1923, ...	5,000.00	5,050.00

Leverett and Mary B. Brainard Free Bed Fund

"To be used in the maintenance of a free bed in said hospital."

BONDS

Chesapeake & Ohio Ry., 4½s, March 1, 1992,	5,000.00	5,150.00

Cheney Brothers Free Bed Fund

The beneficiary to be nominated by Cheney Brothers.

BONDS

Chicago & Western Ind. R. R., 6s, Dec. 1, 1932,	5,000.00	5,500.00

Susan S. Clark Free Bed Fund

"For the endowment of a bed to be under the control of the Rector of Christ Church, Hartford, Conn."

BONDS

Lehigh Valley Ry. of N. Y., 4½s, July 1, 1940,	5,000.00	5,400.00

The Calvin Day Free Bed Fund

"For the purpose of establishing in said hospital a free bed to be known as The Calvin Day Free Bed."

BONDS

	Book Value.	Market Value.
Missouri, Kansas & Eastern Railway, 5s, April 1, 1942, ...	5,000.00	5,750.00

Moses Fox Free Bed Fund

The beneficiary to be nominated by Moses Fox and family.

BONDS

Cleveland, Cincinnati, Chicago & St. Louis Ry., (St. Louis Div., Collateral Trust), 4s, Nov. 1, 1990 (par $5,000), . . .	4,631.25	4,800.00

SAVINGS BANK DEPOSIT

Mechanics Savings Bank, Hartford, . .	368.75	368.75

Daniel Goodwin Free Bed Fund

"The income thereof to be appropriated toward the support of such patients as the President of Trinity College for the time being may direct and approve, subject to the rules of said hospital."

BANK STOCKS

Shares.			
7	Ætna National, Hartford, . . .	791.00	1,750.00
8	Charter Oak National, Hartford, . .	1,080.00	1,120.00

SAVINGS BANK DEPOSIT

Mechanics Savings Bank, Hartford, . .	129.00	129.00

Mrs. George C. Perkins Free Bed Fund

From Mrs. George C. Perkins of Hartford, for the establishment of a free bed.

BONDS

Wheeling & Lake Erie Ry., 5s, Oct. 1, 1926, .	5,000.00	5,450.00

Charles F. Pond Free Bed Fund

From Harriet N. Pond: "To make the bed which my husband had there a free bed forever."

BANK STOCKS

Shares.			
35	Merchants National, New Haven, . .	1,540.00	2,310.00
21	National Exchange, Hartford, . .	1,050.00	1,365.00

GAS STOCK

20	New Britain Gas Light Company, . .	435.00	800.00

BONDS

	Book Value.	Market Value.
Adams Express Co., Coll. Trust, 4s, March 1, 1948, ...	1,000.00	920.00

Miles A. Tuttle Free Bed Fund

"The income thereof to be appropriated for the payment of the expenses in said hospital in such manner and for such patients as the Rector of Christ Church in said Hartford (for the time being) shall direct."

Bills Receivable, Real, ...	1,000.00	1,000.00

Nathan M. Waterman Free Bed Fund

"For the establishment of a free bed, to be called the 'Waterman Bed,' to which my heirs shall have the right to nominate an occupant for all time."

BANK STOCK

Shares.			
30	American National, Hartford, . . .	1,800.00	2,100.00

BONDS

Chicago & Western Indiana R. R., Consolidated 4s, July 1, 1952, ...	1,000.00	950.00

SAVINGS BANK DEPOSIT

Mechanics Savings Bank, Hartford, . .	200.00	200.00

The William B. McCray Fund

"To be used for the maintenance and support of a lying-in ward for friendless women, and for no other purpose."

INSURANCE STOCK

Shares.			
8	Springfield Fire and Marine, . . .	1,700.00	1,920.00

RAILROAD STOCKS

19	Manhattan (Elevated) Railway Co., .	2,135.50	2,698.00
27	New York Central & Hudson River. .	3,382.16	3,618.00
12	The Rock Island Co. of New Jersey, preferred, ...	1,008.00	900.00
16	The Rock Island Company of New Jersey, common, ...	672.00	608.00

MANUFACTURING STOCK

39	The Pratt & Cady Co., Hartford, . .	3,315.00	4,875.00

Shares.		Book Value.	Market Value.
	GAS STOCK		
33	Consolidated Gas Co. of N. Y., . .	5,679.00	4,785.00
	TELEGRAPH STOCK		
20	Western Union Telegraph Co., . .	1,920.00	1,500.00
	BONDS		
	Chicago, Rock Island & Pacific R. R., 4s, Nov. 1, 2002 (par $2,000), . . .	1,660.00	1,600.00
	Bills Receivable, Real, ...	18,000.00	18,000.00
	Savings Bank deposits, received as part of distribution of estate, ...	1,303.59	1,303.59

Ellen M. Watkinson Trust Fund

For support of indigent men and women.

Shares.		Book Value.	Market Value.
	BONDS		
	Chicago, Peoria & St. Louis Ry., Prior Lien, 4½s, March 1, 1930, ...	3,000.00	2,550.00
	Hartford & Conn. Western R. R., 4½s, July 1, 1923, ...	1,000.00	1,010.00
	Lehigh Valley Ry. of N. Y., 4½s, July 1, 1940,	1,000.00	1,080.00
	New York Dock Co., 4s, Aug. 1, 1951, . .	500.00	475.00
	STOCK		
5	New York Dock Co., preferred, . .	353.00	410.00
	SAVINGS BANK DEPOSIT		
	Mechanics Savings Bank, Hartford, . .	147.00	147.00

Nurses Home Library Fund

		Book Value.	Market Value.
	SAVINGS BANK DEPOSIT		
	Mechanics Savings Bank, Hartford, . .	405.80	405.80
		$739,799.92	$814,068.86

SUMMARY.

	Book Value	Market Value
General Fund, ...	$145,709.62	$174,550.
Permanent "	490.00	490.
F. A. and Martha W. Brown "	40,000.00	39,470.
Citizens' Endowment "	25,000.00	28,350.
Daniel P. Crosby "	5,000.00	10,150.
Gurdon Fox "	9,425.00	9,980.
George Hall " No. 1, .	7,520.00	7,800.
George Hall " No. 2, .	23,500.00	30,210.
Harriet Hall "	18,800.00	21,005.
Edwin D. Judd "	5,000.00	5,000.
Keney "	50,000.00	49,267.
Mary J. Keney "	10,200.00	11,400.
The Roland Mather Permanent Fund of the Hartford Hospital, ...	30,000.00	29,000.
Junius S. Morgan Fund, ...	20,185.00	29,885.
Charles H. Northam "	4,132.50	7,270.
Oliver Grant Terry and Amelia Smith Terry Fund, ...	219,754.69	226,965.
Henry I. Wright Fund, ...	10,000.00	12,400.
Samuel Barwick Beresford Free Bed Fund,	5,000.00	5,050.
Leverett and Mary B. Brainard " " "	5,000.00	5,150.
Cheney Brothers " " "	5,000.00	5,500.
Susan S. Clark " " "	5,000.00	5,400.
The Calvin Day " " "	5,000.00	5,750.
Moses Fox " " "	5,000.00	5,168.
Daniel Goodwin " " "	2,000.00	2,999.
Mrs. George C. Perkins " " "	5,000.00	5,450.
Charles F. Pond " " "	4,025.00	5,395.
Miles A. Tuttle " " "	1,000.00	1,000.
Nathan M. Waterman " " "	3,000.00	3,250.
The William B. McCray Fund, ...	40,775.25	41,807.
" " " " " Income, .	1,645.61	1,645.
Ellen M. Watkinson Trust Fund, . . .	6,000.00	5,672.
Orthopedic Fund, ...	149.64	149
Nurses' Home Library Fund, ...	405.80	405
Wildwood Sanatorium, Special, . . .	1,023.22	1,023
Pay-roll, reserve, ...	58.59	58
Bills payable, ...	20,000.00	20,000
	$739,799.92	$814,068

WARD W. JACOBS, *Treasurer*

STATEMENTS FOR FISCAL YEAR ENDED SEPTEMBER 30, 1909.

HARTFORD HOSPITAL — ENTIRE PLANT.

Received from patients, sales, etc., net,		$122,918.52
Income from investments and trust funds, net,		35,507.96
Rents, net,		1,087.04
State annual appropriation, Hartford Hospital,		10,000.00
" " " Tubercular Hospital,		20,000.00
One-half net income from Wildwood Farm (O. P. Home received one-half),		439.83
Received from Tubercular Commission for reimbursement to Tubercular Hospital,		30.60
		$189,983.95
Total net disbursements of entire plant,	$180,609.72	
Expenses, Treasurer's Office:		
Insurance on Hospital buildings and contents for term policies, so that one-third of insurance will expire annually,	1,500.17	
On ice-house, one year,	6.45	
On plate glass window in new operating room, one year,	2.10	
On Wildwood Sanatorium building and contents, three years,	1,000.00	
Office expenses charged to Hartford Hospital, including salaries, printing and incidentals,	1,796.03	184,914.47
Gain for the year ended September 30, 1909,		$5,069.48

HARTFORD HOSPITAL PROPER.

(*Exclusive of Wildwood Sanatorium and Wards 4 and 11 in main Hospital.*)

Received from patients, sales, etc., net,			$97,791.79
Income from investments and trust funds, net,			35,507.96
Rents, net,			1,087.04
State annual appropriation,			10,000.00
One-half net income from Wildwood Farm (O. P. Home received one-half),			439.83
			$144,826.62
Disbursements at the Hospital, net,		$134,705.02	
Insurance on Hospital buildings and contents for term policies, so that one-third of insurance will expire annually,	$1,500.17		
On ice-house, one year,	6.45		

On plate glass window in new operating room, one year,	2.10	1,508.72	
Office expenses, including salaries, printing and incidentals,		1,796.03	138,009.77
Gain for the year ended September 30, 1909,			$6,816.85

TUBERCULAR HOSPITAL.

Comprising Wildwood Sanatorium and Wards 4 and 11 in main Hospital.

Disbursements of entire plant,		$180,609.72
Disbursements of Hartford Hospital Proper,		134,705.02
Disbursements of Tubercular Hospital,		$45,904.70
Disbursements of Wildwood Sanatorium,	$24,668.60	
Disbursements of Wards 4 and 11, based on per capita cost of Hartford Hospital, plus part cost of special attendants,	21,236.10	$45,904.70
Disbursements for insurance on Wildwood Sanatorium building and contents, three years,		1,000.00
		$46,904.70
Total disbursements as shown above,		$46,904.70

Receipts, Wildwood Sanatorium.

From City of Hartford, for board and care of patients,	$5,379.83		
From paying patients,	10,124.09	$15,503.92	

Receipts, Wards 4 and 11.

From City of Hartford, for board and care of patients,	$5,024.26		
From paying patients,	4,598.55	9,622.81	
Receipts for Tubercular Hospital from above sources,		$25,126.73	
State annual appropriation,		20,000.00	
Received from Tubercular Commission for reimbursement,		30.60	$45,157.33
Loss for year ended September 30, 1909,			$1,747.37

WARD W. JACOBS, *Treasurer.*

THE QUICK ASSETS OF THE HARTFORD HOSPITAL SEPTEMBER 30, 1909, ARE

Investments in hands of Treasurer at their market value, but not including investments held as trust funds,		$150,471.56
Real estate not used by the Hospital:		
37 and 39 Congress St., 26 Hudson St., one-half interest in 51 and 51½ Wooster St., one-half interest in Wildwood Farm,		25,500.00
Accounts receivable at Hospital,		16,401.23
Due from Workingmen's Free Bed Fund,		11,010.88
Marketable supplies at Hospital, including Nurses' Home, but excluding Wildwood Sanatorium and Wildwood Farm, as follows:		
Linen,	$10,451.89	
Crockery, etc.,	1,873.30	
Furnishings,	24,744.56	
Medical and surgical supplies,	7,872.16	
Groceries and provisions,	1,395.32	
Printed matter,	290.73	
Library,	400.00	
Plumbing supplies,	635.00	
Supplies for repair department,	300.00	
Laboratory,	750.00	
Tools and implements,	527.00	
Ice plant,	4,350.00	
Unclassified,	246.90	
	$53,836.86	
Less 25% for depreciation,	13,459.21	40,377.65
Marketable supplies at Wildwood Sanatorium, Cedar Mountain, as follows:		
Linen,	$1,692.50	
Crockery, etc.,	353.45	
Furnishings,	4,243.80	
Medical and surgical supplies,	315.57	
Coal,	82.50	
Unclassified,	205.40	
	$6,893.22	
Less 25% for depreciation,	1,723.55	5,169.67

Marketable supplies at Wildwood Farm, as follows:		
Live stock, ...	$2,140.00	
Wagons, tools, apparatus, etc., . . .	799.00	2,939.00
Total, ...		$251,869.99

TRUST FUNDS.

The market value of the Trust Funds of the Hospital is, ...	$587.885.38
The market value of the Citizens' Endowment Fund is, ...	28,350.00

The land, Hospital buildings, and all improvements are not included.

AUDITOR'S CERTIFICATE.

Hartford, Conn., November 19, 1909.

This is to certify that I have audited the accounts of Mr. Ward W. Jacobs as Treasurer of the Hartford Hospital and the Old People's Home Department for the year beginning October 1, 1908, and ending September 30, 1909.

I found duly approved vouchers for all expenditures and securities for all funds invested during the year as per cash books.

I verified the footings of the cash books and traced balances from the ledgers to the balance sheets, and also verified the footings of the abstracts of receipts and expenditures and the statements of Resources.

I also examined the securities called for by the statements of Resources and found all correct.

Respectfully submitted,

CHARLES E. WILSON.

As Auditors of the Treasurer's accounts of the Hartford Hospital, we employed Charles E. Wilson of Hartford to make a thorough examination of the books and accounts of the Treasurer in both the Hospital and the Old People's Home Department for the year ending September 30, 1909, his certificate being a part of this report, and we have personally examined the securities in the invested funds, as shown by the report of the Treasurer, and find the same as reported.

ARTHUR L. SHIPMAN,
HENRY C. DWIGHT,
Auditors.

FREE BEDS

The following have given by will or donated a sum sufficient to endow a Free Bed in the Hospital:

Miles A. Tuttle
Daniel Goodwin
Mrs. Lucy M. Goodwin
Charles F. Pond
Nathan M. Waterman
Cheney Brothers
Moses Fox
Susan S. Clark
Leverett and Mary B. Brainard
Mrs. Gurdon W. Russell
Caroline E. Day
Mrs. George C. Perkins

FORM OF BEQUEST.

I give to the Hartford Hospital in the city of Hartfor
dollars, for the uses and purposes o
said Hospital.

FORM OF BEQUEST FOR FREE BED.

I give to the Hartford Hospital in the city of Hartfor the sum of eight thousand dollars, to be used in the maintenance of a *free bed* in said Hospital.

12

THE FIFTY-FOURTH ANNUAL REPORT

OF THE

Executive Committee of the Hartford Hospital.

To the Directors of the Hartford Hospital:

GENTLEMEN: The Executive Committee herewith presents its Fifty-fourth Annual Report for the current year terminating September 30, 1909. Under this same cover are included the Treasurer's report, in full, of the finances of the Hospital, of the Old People's Home, the report of the Superintendent to the Executive Committee, to which special attention is called, the report of the Medical and Surgical Staffs of the medical and surgical work of the Hospital during the year, and the reports of the Old People's Home and the Hartford Hospital Training School for Nurses.

FINANCES.

In conformity with our report of last year, your Executive Committee presents for your consideration:

FIRST: A statement of the entire cost of operation and receipts of the entire plant.

SECOND: A statement of the cost of operation and receipts of the Hartford Hospital proper.

THIRD: A statement of the cost of operation and receipts of the "Tubercular Hospital," in each of its two sections and combined as a whole, exclusive of the Hartford Hospital proper.

STATEMENT ONE.

HARTFORD HOSPITAL — ENTIRE PLANT.

The total net disbursements of the entire plant amounted to	$180,609.72
Bills contracted during September, 1909, and unpaid September 30, 1909,	8,312.32
Total cost of operation,	$188,922.04
Deduct bills contracted during September, 1908, and paid during fiscal year 1909,	8,308.68
Cost of operation during current year 1909,	$180,613.36

Earnings.

From patients, sales, etc., net,	$122,918.52	
Income from investments and rents, net,	36,595.00	
State appropriation, Hartford Hospital,	10,000.00	
State appropriation, Tubercular Hospital,	20,000.00	
One-half net income from Wildwood Farm,	439.83	
Received from Tuberculosis Commission for reimbursement to Tubercular Hospital,	30.60	189,983.95
Gain of entire plant for current year, internal operation,		$9,370.59
Expenses, Treasurer's office:		
Insurance on Hospital buildings and contents, for term policies, so that one-third of insurance will expire annually,	$1,500.17	
Insurance on ice-house, one year,	6.45	
Insurance on plate glass window in new operating room, one year,	2.10	
Insurance on Tubercular Hospital building and contents, three years,	1,000.00	
	$2,508.72	
Office expenses charged to Hartford Hospital, including salaries, printing and incidentals,	1,796.03	4,304.75
Net gain of entire plant,		$5,065.84

STATEMENT TWO.

HARTFORD HOSPITAL PROPER.

(Separate and distinct from the Tubercular Hospital.)

Receipts from patients, sales, etc.,	$122,918.52	
Deduct amounts received from patients, sales, etc., for Wards 4 and 11, and Wildwood Sanatorium,	25,126.73	$97,791.79
Income from investments and rents, net,		36,595.00
State of Connecticut, annual appropriation,		10,000.00
One-half net income from Wildwood Farm,		439.83
		$144,826.62
Total disbursements of entire plant, internal operation,	$180,609.72	
Deduct cost of maintaining Wards 4 and 11, and Wildwood Sanatorium,	45,904.70	
	$134,705.02	
Add bills contracted during September, 1909, and remaining unpaid September 30, 1909,	6,915.61	
Total cost internal operation,	$141,620.63	
Deduct bills contracted during September, 1908, and paid during present fiscal year,	7,019.88	
Cost for current year,	$134,600.75	
Expenses, Treasurer's office:		
Insurance on Hospital buildings and contents for term policies, so that one-third of insurance will expire annually,	1,500.17	
Insurance on ice-house, one year,	6.45	
Insurance on plate glass window in new operating room, one year,	2.10	
Office expenses charged to Hartford Hospital, including salaries, printing and incidentals,	1,796.03	$137,905.50
Net gain of Hartford Hospital proper,		$6,921.12

STATEMENT THREE.

THE TUBERCULAR HOSPITAL, COMPRISING WILDWOOD SANATORIUM AND WARDS 4 AND 11 OF HARTFORD HOSPITAL.

(Apart and distinct from the Hartford Hospital.)

Disbursements of entire plant under Executive Committee,			$180.609.72
Disbursements of Hartford Hospital proper, . . .			134,705.02
Disbursements of Tubercular Hospital, ...			$45.904.70
Disbursements of Wildwood Sanatorium, .		$24,668.60	
Disbursements of Wards 4 and 11, based on per capita cost of Hartford Hospital, plus part cost of special attendants, . . .		21,236.10	$45.904.70
Disbursement at Treasurer's office for insurance on Tubercular Hospital building and contents, three years, ...			1,000.00
			$46,904.70
Total disbursements as shown above, . .			$46.904.70
Receipts, Wildwood Sanatorium.			
From City of Hartford for board and care of patients, ...		$5.379.83	
From paying patients, ...		10,124.09	
		$15.503.92	
Receipts from Wards 4 and 11.			
From City of Hartford for board and care of patients, . .	$5,024.26		
From paying patients, . . .	4.598.55	9,622.81	
Receipts for Tubercular Hospital from above sources, ...		$25,126.73	
State of Connecticut, annual appropriation for both services, ...		20.000.00	
Received for reimbursement, ...		30.60	45,157.33
Excess of disbursements over receipts, . .			$1.747.37
Add bills contracted during September, 1909, and remaining unpaid September 30, 1909 (Wildwood Sanatorium), ...			1,396.71
			$3,144.08
Deduct bills contracted during September, 1908, and paid during present fiscal year (Wildwood Sanatorium), ...			1,288.80
Total deficit of the Tubercular Hospital for current year, ...			$1.855.28

The foregoing statements tell their own story and happily require little or no elucidation.

As relates to the details of internal administration we refer you to the Superintendent's report, which is clear and ample.

The year terminating September 30, 1909, represents the year of greatest benefaction and service in the history of the Hospital. The total number of patients treated during the year amounted to 3,687. In 1907-8 the total number was 2,989, an increase of 698. The daily average in 1909 was 264; in 1908, 240, an increase of 24. This service, while faithful and efficient, has been rendered under trying and cramped conditions. In the report of last year your Executive Committee recommended as follows: "We were housing at the end of the year ninety persons in the residence and dormitory of the Old People's Home, rented for the purpose, in accommodations provided for sixty-five. The nurses' residence has accommodations for fifty-seven, the dormitory for eight. It is obvious that increased facilities must be provided. Your Executive Committee has had the matter under prolonged and deliberate consideration. The raising of the roof of the residence would be a very costly matter. In these days an elevator would be the next requirement. The more economical and practical way would be to extend a wing to the eastward at right angles in the rear of the present eastern wing and connecting with its corridor. A sketch, with estimates of same, has been procured. It will provide twenty-eight new rooms, fourteen on each flour, with bath-room on each floor and linen closet. The estimated cost will be $15,000. Five thousand has already been subscribed by a generous and interested party. Our recommendation is that the Executive Committee be authorized to proceed with the work, provided that money be raised outside of the present Hospital resources." The ever increasing demand for Hospital service during the fall and winter months constrained us to view our recommendation somewhat apprehensively. The building proposed would meet only the present need. We had made no provision for the future. It seemed to us lacking in wisdom when such radical changes were proposed not to make provision for a future need, apparently imminent. A sketch was prepared providing for 42 rooms instead of 28. This increased provision imperatively required increased accommodation in the dining room and pantry service, which for some years has been inadequate for good service. All this required an outlay more than twice as large as at first contemplated. We are still wrestling with the problem, but recognize as an urgent need for the Hospital; therefore provision must be made in the coming spring. The Hospital has other needs, as reported by the Superintendent. One of them, the provision for female medical patients, can and will be met when the State removes to the County Homes the advanced cases of tuberculosis, now occupying two wards. Provision for the other needs will, we hope, be made in due time, but the imperative need which faces us must receive first consideration.

The personnel of the Hospital for the most part remains the same, save in such changes as time forces upon us. We have lost our genial and able Superintendent, Dr. Winford H. Smith. He was called to a wider field, the superintendency of Bellevue and allied hospitals, and left us March 1st, carrying with him our best wishes and a grateful remembrance of the faithful, tactful and efficient service he rendered the Hospital during his sojourn with us. Dr. Appleton W. Smith, who had enjoyed four years' service in the Boston City Hospital as Superintendent's assistant, succeeded him in the management of the Hospital. We are appreciative of the service he has and is rendering us and take pleasure in calling special attention to his able report.

Owing to the change in character and form of the State appropriation for the tubercular service of the Hospital, from a direct appropriation of $20,000 per annum to $4 per capita per week; in Wards 4 and 11 of the Hospital proper, utilized for advanced cases, we will sustain a loss, compensated for in a measure by the advance from $6 to $7 a week from October 1st, as agreed upon with and advised by the Appropriations'

Committee. In Wildwood Sanatorium, where we care for incipient cases only, should we maintain the daily average of last year, the cost per week having also been advanced to $7, we should be able to meet its expenses. It is to be remembered that the patients in Wards 4 and 11 will be removed to the County Homes as soon as they are provided by the Commission appointed by the Legislature. In the meantime, as a contingent of our Hospital service, they have an unquestioned right to Hospital benefaction.

In conclusion we take pleasure in again acknowledging the invaluable service rendered us by our Medical and Surgical Staffs. In their appended report is ample evidence of the faithful service rendered. We desire, moreover, to express our cordial appreciation of the loyal service rendered us by our Superintendent of the Hospital, the Superintendent of our Training School, the various heads of our departments, and all of our employees. For a more detailed study of our administration, we refer you to the Superintendent's report, with hearty commendation for its completeness.

Respectfully,
William D. Morgan, M.D.,
Louis R. Cheney,
Phineas H. Ingalls, M.D.,
Gilbert F. Heublein,
George C. F. Williams,
Francis R. Cooley.

SUPERINTENDENT'S REPORT

SUPERINTENDENT'S REPORT.

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o the Executive Committee of the Hartford Hospital:

GENTLEMEN: I herewith submit for your consideration the ifty-fourth Annual Report of the Hartford Hospital for the scal year ending September 30, 1909.

	Males	**Females**	**Total**
umber of patients present in the Hospital October 1, 1908, ...	128	119	247
umber of patients admitted during the year,	1,733	1,707	3,440
otal number of patients treated during the year,	1,861	1,826	3,687
umber of patients discharged during the year,	1,748	1,687	3,435
umber of patients remaining Sept. 30, 1909,	113	139	252
umber of infants born in the hospital during the year, . .			142
reatest number of patients present on one day was on April 22d,			321
east number of patients present on one day was on Nov. 30th,			217
aily average number of patients, ...			264

	1908-09	1907-08	1906-07	
umber of days treatment furnished,	96,151	87,516	80,853	
umber of patients treated in, . .	3,440	2,989	2,681	
aily average number of patients, .	264	240	222	
aily average number of patients (exclusive of tuberculosis patients), .	187	169	150	
verage number of days' residence for each patient, . . .				26
verage number of days' residence (excluding tuberculosis patients), ...				20
aily average number of patients exclusive of tuberculosis patients,				190
umber of days' treatment furnished exclusive of tuberculosis patients, ...				68,040
aily cost per capita (for Hospital proper excluding Wildwood Sanatorium), ...				$1.89
aily cost per capita (deducting repairs and improvements), .				1.82
ecrease in daily cost per capita over last year, . . .				.03

The monthly admissions have been as follows:

1908	October, . . .	247	May, ...	335
	November, . .	228	June, ...	308
	December, . .	236	July, ...	301
1909	January, . . .	232	August, . . .	309
	February, . .	284	September, . .	297
	March, . . .	330		
	April, . . .	333	Total, . . .	3,440

The number of days' treatment during the year have been as follows:

1908	October, . . .	7,796	May, ...	8,879
	November, . .	7,028	June, ...	8,167
	December, . .	7,051	July, ...	8,186
1909	January, . . .	7,448	August, . . .	7,974
	February, . .	7,549	September, . .	8,052
	March, . . .	9,024		
	April, . . .	8,997	Total, . . .	96,151

Note — The statistics given above refer to the Hartford Hospital as a whole, including all departments, unless otherwise specified.

The various funds and free beds have cared for 178 patients as follows: Samuel Barwick Beresford Free Bed, 364 days' treatment for 6 patients; Leverett and Mary B. Brainard Free Bed, 215 days' treatment for 9 patients; Cheney Brothers Free Bed, 307 days' treatment for 10 patients; Moses Fox Free Bed, 364 days for 13 patients; Daniel Goodwin Free Bed, 17 days for 2 patients; Nathan A. Waterman Free Bed, 354 days for 5 patients; Lucy M. Goodwin Free Bed, 230 days for 8 patients; The Calvin Day Free Bed, 224 days for 7 patients; Susan S. Clark Free Bed, 175 days for 5 patients; Mrs. George C. Perkins Free Bed, 224 days for 4 patients; The William B. McCray Fund, 679 days for 38 patients; Keney Fund, 1,085 days for 71 patients, making a total of 4,238 days' free treatment for 178 patients. This does not include patients paid for by the New Unit System for Tuberculosis.

RECEIPTS.

The following is a detailed statement of all moneys received during the fiscal year for the care of patients and from all other sources at the Hospital. It is shown under two heads, that received at the Hospital and that paid directly to the Treasurer. All money received at the Hospital has been duly deposited with the Treasurer and receipted for by the Treasurer. This does not include the income received from Free Beds.

	Received at Hospital office	Received at Treas. office	Total	Increase.
HOSPITAL PROPER.				
Private room patients, .	$32,890.03	$275.26	$33,165.29	$3,681.27
Operating room fees, .	3,685.00		3,685.00	1,254.50
Ward patients, . .	37,264.00	584.95	37,848.95	6,162.63
Special nursing, . .	8,267.42		8,267.42	671.06
City of Hartford, . .		2,462.95	2,462.95	1,395.49
McCray Fund, . .		1,661.50	1,661.50	44.21
Keney Fund, . . .		1,085.25	1,085.25	306.55
Sales, ...	3,017.11	27.00	3,044.11	988.99
Towns, ...	5,548.48		5,548.48	815.72
Soldiers' Hospital Board,	853.71		853.71	669.43
Rents, ...	1,148.00	40.00	1,188.00	340.00
Births and deaths, . .	88.50		88.50	1.00
Miscellaneous, . . .		80.63	80.63	80.63
Total, ...	$92,762.25	$6,217.54	$98,979.79	$12,916.98
WILDWOOD SANATORIUM.				
Private room patients, .	$889.22		$889.22	$889.22
Ward patients, . . .	7,732.03	$239.99	7,972.02	4,109.29
City of Hartford, . .		5,267.27	5,267.27	1,471.74
Towns, ...	1,303.15		1,303.15	785.44
Soldiers' Hospital Board,	102.86		102.86	102.86
Workingmen's fund, .				1,336.54
Total, ...	$10,027.26	$5,507.26	$15,534.52	$6,022.01
WARDS 4 AND 11.				
Private room patients, .	$1,306.86		$1,306.86	$1,306.86
Ward patients, . .	2,007.47	$293.99	2,301.46	394.37
City of Hartford, . .		5,136.82	5,136.82	248.42
Towns, ...	877.67		877.67	180.61
Workingmen's fund, .				749.26
Soldiers' Hospital Board,				43.72
Total, ...	$4,192.00	$5,430.81	$9,622.81	$309.52
Grand Total, . .	$106,981.51	$17,155.61	$124,137.12	$18,269.47

"The Workingmen's Fund" has been superseded by the "Tuberculosis Relief Association," and aid given by this association is included under "Ward Patients."

DISBURSEMENTS.

The following tables give a detailed account of the gross disbursements of the Hartford Hospital, including Wards 4 and 11, a detailed account of the Wildwood Sanatorium disbursements, a statement of the cost of maintaining Wards 4 and 11, and a general summary showing the cost of the entire hospital and of the different divisions:

ADMINISTRATIVE EXPENSES.

		Increase
Salaries, officers and clerks,	$5,590.33	* $217.98
Office expenses,	33.12	* 61.93
Stationery, printing and postage,	1,290.91	* 58.20
Telegraph and telephone,	810.02	6.76
Miscellaneous,	229.63	* 72.02
Total administration expenses,	$7,954.01	* $403.37

PROFESSIONAL CARE OF PATIENTS.

Salaries and wages:		
Pharmacist,	$847.15	* $88.85
Supt. of nurses, assistants and instructors,	6,323.66	878.51
Nurses,	6,115.50	613.12
Special nurses,	7,086.32	1,230.89
Orderlies,	3,734.30	* 202.63
Ward employees,	2,777.57	36.95
Tuberculosis attendants,	2,009.13	749.34
Equipment for nurses:		
Books,	287.88	135.77
Medical and surgical supplies:		
Apparatus and instruments,	604.86	* 287.26
Instruments (receivable as sales),		* 14.75
Medical supplies,	4,116.00	* 425.07
Surgical supplies,	5,280.89	* 104.11
Alcohol, liquors, wines, etc.,	551.60	180.27
Dispensary Eye and Ear:		
Supplies,		* 8.24
Doctors' uniforms,	138.00	5.50
Orderlies' uniforms,	99.00	74.75
Total professional care of patients,	$39,971.86	$2,613.69

DEPARTMENT EXPENSES.

				Increase.
Laboratory:	Supplies,	$256.84	$256.84	*$24.54
Training School:	Salaries and labor,	1,562.91		
	Supplies,	1,019.89—	2,546.80	959.98
Housekeeping:	Labor,	4,147.35		
	Supplies,	6,972.15—	11,119.50	*1,453.22
Kitchen:	Labor,	3,857.30		
	Supplies,	890.18—	4,747.48	77.08
Laundry:	Labor,	3,713.40		
	Supplies,	1,494.95—	5,208.35	*1,712.18
Steward's department:				
Labor,		4,517.55		
Milk,		7,390.04		
Cream,		1,293.42		
Groceries,		7,230.04		
Butter,		5,434.62		
Eggs,		3,889.41		
Fruits,		5,117.77		
Vegetables,		4,447.09		
Meat,		11,741.75		
Poultry,		4,230.19		
Fish,		1,377.99—	56,669.87	
			(see note)	*8,679.37
Total Department expenses,			$80,548.84	$10,832.25

NOTE: — This large decrease is accounted for by the fact that heretofore under the items "groceries, meat, poultry, fish," provisions for all departments were included; this year they are for Hospital proper, including Wards 4 and 11.

GENERAL HOUSE AND PROPERTY EXPENSES.

Electric lighting,	$1,939.15	*$14.65
Fuel, oil and waste,	9,489.77	605.40
Water,	1,983.31	607.96
Gas,	870.35	*8.50
Ice (electric power for ice machine),	1,156.27	*430.69
Maintenance, real estate and building,	6,000.10	2,223.00
Maintenance, machinery and tools,	419.82	78.93
Plumbing and steam fitting,	595.65	180.26
Miscellaneous,	902.32	112.79
Engineers' department, salaries,	1,920.01	84.52
Plumbing department, salaries,	1,281.83	201.83
Total general house and property expenses,	$26,558.58	$3,640.85
Total operating expenses,	$155,033.29	*$4,981.08

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* Decrease.

CAPITAL EXPENDITURES.

Additions and betterments, buildings,	$381.38	*$4,629.57
Furniture and fixtures (if charged to capital account),	80.50	*3,131.13
New machinery (if charged to capital account),	180.95	38.25
Apparatus and instruments (if charged to capital account),	265.00	138.74
Total capital expenditures,	$907.83	*$7,583.71
Gross expenditures,	$155,941.12	$12,564.79

SUMMARY.

Gross expenditures,	$155,941.12
Deduct amount of special nursing (which comes back as receipts),	7,086.32
Cost of Hartford Hospital, including Wards 4 and 11,	$148,854.80
Deduct capital expenditures,	907.83
Net cost of Hartford Hospital Proper (includes Wards 4 and 11),	$147,946.97
Cost of Wards 4 and 11,	21,236.10
	$126,710.87

WILDWOOD SANATORIUM.

		Increase.
Salaries,	$4,591.13	$921.12
Office expenses,	117.30	117.30
Stationery, printing and postage,	105.30	34.98
Telegraph and Telephone,	38.40	*3.80
Apparatus and instruments,	3.00	2.60
Medical supplies,	651.99	66.93
Surgical supplies,	134.52	*7.65
Orderlies' uniforms,	12.00	.90
Housekeeping supplies,	929.20	112.11
Kitchen supplies,	46.36	*4.28
Laundry supplies,	1,516.05	284.98
Bread,	368.81	76.57
Milk,	2,389.32	511.43
Groceries,	943.51	82.48
Butter,	664.95	16.25
Eggs,	1,356.46	221.24
Fruits,	737.53	*5.99
Vegetables,	847.89	166.61
Meat,	3,628.66	1,109.66
Poultry,	447.98	1.93
Fish,	295.64	67.33

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* Decrease.

		Increase.
Electric lighting,	356.54	50.59
Fuel, oil and waste,	1,132.01	*204.07
Water,	250.08	104.86
Ice,	391.31	223.31
Maintenance, real estate and buildings,	642.11	*229.67
Maintenance, machinery and tools,	38.98	30.05
Miscellaneous,	922.39	44.21
Safe,	59.50	59.50
New lockers,	600.00	600.00
New refrigerator,	449.68	449.68
New sewer (in last report),		*1,044.78
	$24,668.60	$3,856.38

WARD 4 AND 11.

Cost of maintenance, based on per capita cost of Hartford Hospital proper plus the cost of special attendants,	$21,236.10

SUMMARY SHOWING COST OF ENTIRE HOSPITAL AND OF THE DIFFERENT DIVISIONS.

Gross expenditures,		$195,610.55
Deduct supplies furnished Old People's Home,	$5,840.05	
" " " Sanatorium,	9,160.78	15,000.83
Net cost of maintaining entire plant,		$180,609.72
Cost of maintaining Wildwood,	$24,668.60	
" " " Wards 4 and 11 (based on per capita cost of Hospital and charges for special attendants),	21,236.10	
Cost of maintaining entire T. B. division,	$45,904.70	
Cost of maintaining entire plant,		$180,609.72
Deduct cost of maintaining tuberculosis division,		45,904.70
Total expenditures for Hartford Hospital proper,		$134,705.02
Deduct amount paid out for special nursing,	$7,086.32	
Deduct capital expenditures,	907.83	7,994.15
Cost of Hospital proper, including repairs and improvements,		$126,710.87
Deduct cost of repairs and improvements,		7,015.57
Actual running expenses of Hospital proper,		$119,695.30

NOTE: — The Hospital buys all food supplies for all departments and then sells to the Old People's Home and Wildwood Sanatorium at cost, thus enabling them to get better prices.

The amount paid for special nursing is deducted above for the

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*Decrease.

reason that the Hospital pays the nurses as an accommodation to the patient and then collects from the patient. This amount then does not enter into the running expenses.

The preceding exhibition of the financial condition of the Hospital is certainly a most gratifying one, showing as it does an increase in receipts of $18,629.47. The increased cost in actual running expenses of the Hospital proper, amounting to $6,762.08 — about 6 per cent., may well be accounted for in the increased cost of provisions. The U. S. Army, in estimating the amount of money required for subsistence for the coming year, will ask for a 7 per cent. increase over that received last year for the same purpose, as they have considered that ratio to measure the increased cost of rations.

During the past year we have cared for 451 more patients with 8,635 more days of treatment than last year, which up to that time had been the record year. Our private patients have increased over 43 per cent. in numbers, there having been a total of 830 admissions. The Visiting Staff, as well as many others of the medical fraternity, are recognizing more and more the facilities offered here for the care of their patients and are taking advantage of them. Their selection of this Hospital for the treatment of their cases is heartily appreciated and they may rest assured that every effort will be made to please them and render every assistance possible. The well nigh universal words of praise by the patients themselves for the treatment and attentions received show that the general public are beginning to recognize the advantages of hospital care.

The Dunham Operating Room, off the Private Patients' Corridor, which is for their exclusive use, is demonstrating its value all the time: during the past year the number of patients operated upon in this room increased 38 per cent.

The Erwin Operating Rooms, opened within the year, have proved their usefulness and are in almost daily use. There are no better equipped rooms for their purpose in any city.

The statistical tables which follow will show the amount and character of the work being done in caring for the sick, and testify to an unusually busy year.

TUBERCULOSIS DIVISION.

Although more patients have been admitted to the wards for advanced cases of tuberculosis this year than last, the daily average has been two less. At Wildwood Sanatorium, on the other hand, the daily average has increased by eight, making the total increase in daily average for the entire division six. The Legislature at its recent session withdrew its special appropriation of $20,000 a year for the care of tuberculous cases in this Hospital, and from the first of October will pay us $4 a piece per week for each such patient cared for. It also appropriated a large sum of money for the establishment of County Homes to be located for the present in the three largest counties of the State, and when these homes are in running order, which may not be for a year at least, they will then take all our advanced cases. When this is accomplished one prevailing, though unwarranted, objection to private patients coming here for treatment will be removed. Dr. Bartlett is still resident physician at the Wildwood Sanatorium and Miss Kernan remains as Matron. Dr. Bartlett's report of the year's work at the Sanatorium appears on pages

During the past year many improvements have been made at Wildwood Sanatorium, chief of which were the making over of the refrigerator and the installing of new lockers. The old refrigerator did not meet the requirements and on account of the scarcity of ice last summer, which made it necessary to buy ice rather than to use ice harvested on the farm, it was necessary to entirely rebuild the refrigerator, which was done at an expense of $450. The patients have long needed suitable lockers where they could keep their clothing and possessions. Large white enameled steel lockers were expressly constructed and set up at a cost of $600, so that now each patient has a locker for his own use and a separate key. Other improvements and some needs are mentioned in the report of the resident physician.

Wildwood Sanatorium.

Number of patients present October 1, 1908,	49
Number of patients admitted during the year,	106
Total number of patients treated during the year,	155
Number of patients discharged during the year,	111
Number of patients remaining September 30, 1909,	44
Daily average number of patients,	49
Number of days treatment given,	17,938
Average number of days' residence of each patient,	116
Daily cost per capita,	$1.375

Wards 4 and 11.

Number of patients present October 1, 1908,	23
Number of patients admitted during the year,	213
Total number of patients treated during the year,	236
Number of patients discharged during the year,	204
Number of patients remaining September 30, 1909,	32
Daily average number of patients,	28
Number of days treatment given,	10,173
Average number of days' residence of each patient,	43
Daily cost per capita,	$1.89

MEDICAL AND SURGICAL STAFFS.

On the House Staff Drs. Howard Bulkeley Haylett, Charles Henry Turkington and Harry Foster Markolf have completed their terms of service and have left the Hospital. The House Staff is now constituted as follows:

Wilbur Leslie LeCron, House Physician.
Carl Herbert Bryant, House Surgeon.
Dwight Wallace Tracy, House Gynecologist.
Edward Adams Deming, Asst. House Surgeon.
Wilfred Ellsworth Rounseville, First Asst. House Physician.
Jennings Crawford, Second Asst. House Physician.
Philip Charles Jeans, Third Asst. House Physician.

The House Staff has performed its duties conscientiously and well, and the Hospital is to be congratulated upon its personnel. Owing to the rapidly increasing number of patients, both private and ward, the number of the staff is too small to do the work allotted to them with satisfaction to themselves and with justice to the patients. On recommendation of the Visiting Staff your Committee has voted that the House Staff be increased from seven to eight, and the term of service reduced from twenty-one months to sixteen months and two weeks. Owing to the paucity of applicants who appeared for the examination last April only enough men were appointed to fill the vacancies as they arose for the current year. This change will go into effect just as soon as men can be found to fill the extra positions thus created.

EXECUTIVE DEPARTMENT.

Last February Dr. Winford H. Smith, then Superintendent, left the Hospital to enter a larger field of usefulness as Medical Superintendent of Bellevue and Allied Hospitals, New York City. He went with the regrets and well wishes of a host of friends. He left the Hospital so well organized and so smoothly running that it made it much easier for his successor to assume charge. Miss Lauder Sutherland still remains the efficient Superintendent of Nurses and Principal of the Training School. On the Office Staff Mr. John E. Fay remains as Chief Clerk, Mr. John J. Rogerson as Bookkeeper and Miss May Conway as Assistant Clerk and Stenographer. Mr. Williams J. Devine is still Steward, Mrs. Josephine Sperry Housekeeper, and Miss Margaret Hendron, Head Laundress. I wish to bear witness to the fidelity and capabilities of my assistants. Mr. Orrin F. Ives has resigned as Pharmacist and his place is satisfactorily filled by Mr. James J. Dunn.

IMPROVEMENTS.

The new boilers installed at the close of last year have been used for the first time this year; though last winter was a mild one, yet the few coldest days gave no apprehension but that they will satisfactorily heat all the present buildings in the most severe weather. The new laundry building is well adapted for its purpose and with practically all new machinery is giving excellent results. Increased demands, necessitated by a constantly increasing number of patients, upon the laundry equipment will require new and larger machines from time to time. By cutting a new door into the big refrigerator a compartment of same was set aside for the uses of the diet kitchen. Where the old diet kitchen refrigerator stood a table has been built, and by making a few other minor changes there more room was obtained for the preparation of the trays, but even now when there is a " full house " the facilities are taxed to their utmost. During the summer much painting has been done which has improved the appearance of things greatly. Ward 10 and adjoining rooms and corridor have been repainted as well as private rooms on the Private Patients Corridor and the Dunham Operating Room; also the general administrative offices and a few other private rooms and ward kitchens.

NEEDS.

The most pressing need at the present time is enlarged accommodations for our nurses. Many of the nurses' rooms at the Residence are occupied by two nurses, where they were only meant for one; some rooms are even used by day nurses at night and by night nurses in the daytime. Fourteen nurses are being taken care of in makeshift apartments in one of the dormitories at the Old People's Home, and even rooms in near-by private houses have had to be rented to take care of the overflow. More and better accommodations should be provided for our employees; at times it is difficult to get first-class help because they are not satisfied with the rooms provided for them. The male and female employees should be entirely separated.

There should be a large ward provided for the exclusive use of female medical patients. At present they are crowded into a room none too large for half their number. There should also be a few rooms for isolating female patients when the need arises. It often happens that they should be placed in rooms by themselves, but there are no rooms available.

A consulting and retiring room should be provided for our physicians and surgeons who have no such accommodation at the present time. Other needs might be mentioned, such as a separate ward for private maternity cases; but the above seem to me to be imperative needs at the present time.

It is a question if very many of the citizens of Hartford fully realize that such an institution as the Hartford Hospital exists in their midst; to many who visit it for the first time it comes as a complete revelation, the advantages and facilities here available for the care of those requiring medical attention. It is always a pleasure to show what we have here to any that are interested, and it is hoped that more and more people will become interested and pay the institution a visit.

To all those who have in any way contributed to the comfort and welfare of our patients, whether specifically mentioned or not; to the clergy who have been constant in their spiritual and friendly ministrations; to the Visiting Staff; to the Treasurer and his assistants, and to your Committee who have given freely and unstintedly of your time and much personal consideration, my grateful thanks are extended.

Respectfully submitted,

Appleton W. Smith, M.D.,

Superintendent.

Occupations of Patients.

Accountants	2
Actress	1
Adjusters	2
Aligner	1
Awning Hanger	1
Auto builder	5
Author	1
Architects	2
Artist	1
Asst. Matron	1
Assemblers	8
Asst. Secretaries	5
Asst. Superintendent	1
Attendants	5
Bakers	8
Banker	1
Barbers	24
Bartenders	6
Belt makers	4
Blacksmiths	13
Boilermakers	2
Bookbinder	1
Bookkeepers	11
Bootblack	1
Butchers	7
Butlers	2
Buyer	1
Boxmakers	2
Brakemen	9
Bricklayers	27
Brass workers	5
Canvasser	1
Caretakers	3
Carpenters	50
Carriage builder	1
Carriage trimmer	1
Cashiers	4
Cash boy	1
Chauffeurs	7
Clergymen	7
Clerks	56
Clockmakers	7
Coachmen	6
Companion	1
Compositor	1
Conductors	6
Confectioners	5
Contractors	4
Coppersmiths	4
Copyist	1
Cooks	17
Dentists	2
Dispatchers	2
Designer	1
Detective	1
Dietitian	1
Dramatists	2
Draughtsmen	7
Dressmakers	13
Druggist	1
Elevator men	4
Electricians	14
Enameler	1
Engineers	17
Envelope cutters	2
Errand boys	2
Expressmen	6
Farmers	113
Firemen	7
Flagmen	3
Foremen	9
Forgers	3
Fuse workers	7
Gardeners	9
Governess	1
Gunsmith	1
Grinders	3
Grocers	9
Hairdressers	4
Hat finisher	1
Helpers	3
Housekeepers	869
Hostlers	4
Hotel manager	1
Icemen	4
Insurance clerks	11
Iron moulders	10
Inspectors	4
Ivory workers	2
Janitors	5
Jewelers	2
Journalist	1
Laborers	198
Laundresses	10
Lathers	5
Lawyers	3
Letter carriers	1
Linemen	4
Locksmiths	6
Lumbermen	7
Machinists	98
Mechanics	28
Managers	3
Manufacturer	1
Maids	120
Marble workers	2
Mattress makers	2
Merchants	10
Millhands	29
Milliners	9
Milkdealers	5
Moulders	17
Motormen	7
Nailmakers	8
Newsdealer	1
None	218
Nurses	70
Nurse girls	3
Office boys	2
Orderlies	13
Organ builder	1
Overseers	2
Painters	36
Paperhangers	9
Papermakers	6
Pastors' Assts.	2
Patternmakers	4
Peddlers	26
Physical director	1
Physicians	13
Photographers	2
Platers	2
Piano tuner	1

Plumbers	8
Porters	4
Polishers	7
Presshands	2
Printers	8
Prison officer	1
Proofreader	1
Quarryman	1
Rabbi	1
Rag pickers	2
R. R. Employees	6
Real estate agts.	3
Reporter	1
Rubberworkers	10
Salesladies	10
Salesmen	14
Saloonkeepers	25
Schoolgirls	189
Schoolboys	252
Screwmakers	4
Sextons	3
Shoedealers	9
Shophands	115
Spinners	4
Springmakers	2
Stampers	2
Statistician	1
Stagehand	1
Stenographers	15
Steamfitters	6
Stockbroker	1
Stonecutters	13
Students	33
Superintendents	4
Tailors	16
Teachers	21
Teamsters	47
Telephone operators	7
Tinners	2
Tiremaker	1
Tobacco sorters	6
Toolmakers	10
Travelers	7
Train caller	1
Treasurer	1
Trimmers	6
Truckmen	10
Umbrella menders	4
Undertaker	1
U. S. Officer	1
Waitresses	18
Watchmen	5
Watchmakers	7
Weavers	13
Winders	6
Woodworkers	2
Total,	3440

Residence of Patients.

Abington, Conn.
Addison, Conn.
Amenia, N. Y.
Arlington, Mass.
AshleyFalls, Mass.
Avon, Conn.
Bantam, Conn.
Barkh'mst'd, Conn.
Berkeley, Cal.
Berlin, Conn.
Burnside, Conn.
Burrville, Conn.
Burlington, Conn.
Buckland, Conn.
BroadBrook, Conn.
Bristol, Conn.
Bridgeport, Conn.
Branford, Conn.
Brooklyn, Conn.
Brooklyn, N. Y.
Bridgewater, Conn.
Bloomfield, Conn.
Boston, Mass.
Bolton Notch, Conn.
Buffalo, N. Y.
Canaan, Conn.
Charlottesville, Va.
Chester, Conn.
Chicago, Ill.
Clinton, Mass.
Cobalt, Conn.
Collinsville, Conn.
Concord Jc., Mass.
Danbury, Conn.
Deep River, Conn.
East Berlin, Conn.
E. Charlemont, Mass.
E. Hartford, Conn.
E. Hampton, Conn.
E. Haddam, Conn.
E. Windsor Hill, Conn.
Elmwood, Conn.
Ellington, Conn.
Elmore, Vt.
Enfield, Conn.
Farmington, Conn.
Falls Village, Conn.
Forestville, Conn.
Glastonbury, Conn.
Gildersleeve, Conn.
Greenwich, Conn.
Granby, Conn.
Griswoldville, Conn.
Haddam, Conn.
Hadlyme, Conn.
Hartford, Conn.
Hayden Sta., Conn.
Higganum, Conn.
Highland Park, Conn.
Hockanum, Conn.
Holyoke, Mass.
Ivoryton, Conn.
Jacksonville, Fla.
Jersey City, N. J.
Jewett City, Conn.
Kensington, Conn.
Lakeville, Conn.

Leominster, Mass.
Litchfield, Conn.
Lyme, Conn.
Manchester, Conn.
Malden, Mass.
Mansfield Ctr., Conn.
Mansfield Depot, Conn.
Meriden, Conn.
Middletown, Conn.
Milldale, Conn.
Moosup, Conn.
New Britain, Conn.
New Haven, Conn.
New London, Conn.
New York, N. Y.
Newington, Conn.
Newington Jc., Conn.
Newington Park, Conn.
Norwich, Conn.
Naubuc, Conn.
No. Bloomfield, Conn.
No. Lyme, Conn.
No. Westchester, Conn.
No. Grosvenordale, Conn.
No. Windham, Conn.
Norfolk, Conn.
Oakville, Conn.
Paterson, N. J.
Pittsburg, Pa.
Plainville, Conn.
Plantsville, Conn.
Putnam, Conn.
Pleasant Valley, Conn.
Poquonock, Conn.
Providence, R. I.
Portland, Conn.
Rockville, Conn.
Rocky Hill, Conn.
Saybrook, Conn.
Saybrook Pt., Conn.
Salem, Conn.
South Farms, Conn.
So. Coventry, Conn.
So. Windham, Conn.
So. Willington, Conn.
Southington, Conn.
Southbury, Conn.
Scitico, Conn.
St. Louis, Mo.
Somers, Conn.
Shelton, Conn.
Stafford Springs, Conn.
Tariffville, Conn.
Terryville, Conn.
Thomaston, Conn.
Turners Falls, Mass.
Torrington, Conn.
Tolland, Conn.
Unionville, Conn.
Vernon, Conn.
Vernon Cr., Conn.
Watertown, Conn.
Ware, Mass.
Wallingford, Conn.
Warrenville, Conn.
Waterbury, Conn.
West Chester, Conn.
West Haven, Conn.
West Hartford, Conn.
West Morris, Conn.
West Goshen, Conn.
Westfield, Mass.
Winchester, Conn.
Westbrook, Conn.
Wilkesbarre, Pa.
Wilson, Conn.
Wilson Sta., Conn.
Winsted, Conn.
Windham, Conn.

Nativity of Patients.

Armenia	5	Greece	7	South America	2
Austria	65	Ireland	158	Spain	1
Canada	80	Italy	151	Sweden	137
China	5	Japan	2	Switzerland	4
Cuba	1	New Foundland	1	Turkey	4
Denmark	18	Norway	3	United States	2156
England	74	Persia	2	Unknown	38
Finland	7	Roumania	16	Wales	1
France	5	Russia	367		
Germany	110	Scotland	20	Total,	3440

DONATIONS.

Through the kindness of the editors we have received the *Hartford Courant, Hartford Times, Hartford Saturday Journal, East Hartford Weekly Gazette, Middletown Penny Press, New York Medical Journal, The Churchman* and the *New Britain Herald.*

Magazines, Papers and Books.

Y. M. C. A.,
E. S. Arnold,
Dr. G. P. Davis,
Mrs. Charles A. Rapelye,
Mrs. Geo. H. Day,
L. W. Dischert,
Mrs. James J. Goodwin,
G. F. Heublein,
Mrs. George C. Perkins,
J. H. Brewster,
Mrs. S. B. St. John,
Miss A. L. Taylor,
Mrs. M. M. Smith,
Mrs. Robinson,
E. C. Hillard,
Mrs. A. M. Hills,
H. B. Freeman,
Deep River Wheel Club,
Mrs. E. C. Frisbie,
Mrs. F. Beauregard,
J. F. Garrette,
Mrs. Morrow,
Mary C. Taylor,
Donald H. Rapelye,
Wm. and Jos. Albin.

Fruits and Flowers.

Mrs. H. G. Simmons (funeral),
Mr. Taylor (funeral),
Mrs. F. A. King,
Grand Lodge of Pythian Sisters,
Col. Judd (funeral),
Hartford Golf Club,
Mrs. Henry W. Clark,
Miss Clark,
W. J. de Mauriac,
Robert Merriman (funeral),
A Friend,
Catherine Reisel (funeral),
Mrs. J. B. Waters (funeral),
Mr. J. W. Lester (funeral),
Kingsley & Smith,
D. N. Barney,
Mrs. Brocklesby,
R. L. Dow (funeral),
Mrs. C. L. Hills,
Eva Parkhurst,
Mrs. Francis Parsons (funeral),
C. N. Roberts (funeral),
Mrs. Wm. Lorenz,
Dr. W. W. Knight,
Mr. G. Mourad,
Ruth Northam (funeral),
Northwest School,
E. A. Fuller,
Luke Horsfall (funeral),
E. B. Dillingham (funeral),
Mrs. Keep,
Mrs. A. W. Northam,
Chester Grammar School,
Farmington Ave. Cong. Church,
Elmwood Sunday School,
City Guards,
Mrs. Ansel Cook,
Forget-Me-Not Club,
First Baptist Sunday School,
John Coombs,
W. C. T. U., Granby, Conn.,
Dr. E. R. Lampson,
Mrs. Thos. N. Hepburn,
Dr. G. P. Davis,
Mrs. James L. Howard (funeral),
Mrs. Stevens (funeral),
Gertrude Stadtmuller,
M. E. McDonald, Simsbury, Conn.,
W. H. Legate.

Clothing, Cotton and Old Linen.

Mrs. Howard,
Miss C. G. Fowler,
Mrs. James J. Goodwin,
Ladies' Sewing Society,
Mrs. Chas. Forrest.

Miscellaneous.

Mrs. Cummings, rubber plant.
Idle Hour Club, puzzles of Hartford bridge.
Mrs. James J. Goodwin, toys.
Mrs. H. S. Redfield, toys.
Kate Lord, toys.
Miss Pardee, $5.00.
Dr. O. C. Smith, gas-oxygen anæsthetizing outfit.
Mrs. A. M. Hills, electric battery, crutches.
Sedgwick & Casey, piano stool.
J. B. Bunce, ice cream.
Mrs. R. B. Parker, 3 baby carriages, basinet.
John Gaton, crutches.
Jos. M. Merrow, $25.00.

GENERAL STATISTICS.

YEARS.	Admitted during the year.	NUMBER EACH YEAR.						Remaining at the end of the year.	Daily average for the year.	NO. EACH DAY.	
		Under care.	Discharged.	Recovered.	Improved.	Not improved.	Dead.			Greatest.	Least.
1860–1861	45	45	32	21	7	1	3	13	12	14	1
1861–1862	258	271	214	159	20	12	23	57	27	85	14
1862–1863	107	164	141	103	15	5	18	23	18	57	11
1863–1864	157	180	149	103	14	8	24	31	27	45	21
1864–1865	132	163	142	102	2	9	29	21	27	31	21
1865–1866	196	277	172	133	5	8	26	45	35	49	21
1866–1867	221	266	211	176	8	5	24	55	44	59	29
1867–1868	251	306	250	183	16	15	36	56	50	63	38
1868–1869	259	315	260	192	18	16	34	55	55	67	42
1869–1870	248	339	298	220	21	20	37	41	50	62	36
1870–1871	329	370	303	210	28	18	50	64	63	67	39
1871–1872	347	411	345	215	42	46	41	66	62	71	59
1872–1873	370	436	368	206	70	31	55	68	69	76	56
1873–1874	452	520	422	299	36	29	58	98	79	98	63
1874–1875	492	590	486	323	53	29	53	104	95	119	71
1875–1876	603	707	573	376	64	35	57	134	113	136	90
1876–1877	599	733	613	378	85	49	72	120	130	149	112
1877–1878	914	1,034	944	591	117	66	100	90	101	122	80
1878–1879	538	628	533	307	93	37	68	95	97	113	87
1879–1880	597	692	589	362	93	38	66	103	94	109	78
1880–1881	649	752	360	392	99	33	102	92	96	107	83
1881–1882	736	828	734	404	154	62	89	94	97	115	90
1882–1883	723	817	720	391	161	63	95	97	94	117	83
1883–1884	701	798	697	362	158	69	93	101	98	118	86
1884–1885	747	848	746	392	177	81	85	102	114	139	92
1885–1886	741	843	743	404	178	60	90	100	107	130	63
1886–1887	770	870	760	402	162	66	117	110	108	139	83
1887–1888	745	855	764	436	146	56	108	91	108	137	87
1888–1889	845	936	831	496	148	61	117	105	111	143	83
1889–1890	998	1,103	983	566	183	71	144	120	127	156	105
1890–1891	928	1,048	946	522	195	82	145	102	110	132	83
1891–1892	1,074	1,176	1,079	581	271	75	152	97	120	137	89
1892–1893	1,169	1,266	1,155	645	254	97	159	111	122	145	88
1893–1894	1,151	1,292	1,126	657	216	90	163	136	130	153	101
1894–1895	1,295	1,431	1,133	854	233	74	141	129	138	160	102
1895–1896	1,563	1,692	1,568	1,128	189	71	180	124	144	160	91
1896–1897	1,558	1,682	1,521	991	265	78	187	161	144	166	113
1897–1898	1,622	1,783	1,585	1,157	212	46	170	198	158	205	119
1898–1899	1,714	1,912	1,740	1,278	154	70	238	172	163	224	138
1899–1900	2,030	2,202	2,004	1,356	216	111	265	198	155	205	123
1900–1901	2,012	2,210	2,035	1,304	242	67	232	175	164	206	139
1901–1902	2,116	2,291	2,102	1,253	314	122	240	187	170	234	155
1902–1903	2,388	2,575	2,355	1,566	177	103	322	220	234	275	185
1903–1904	1,992	2,212	1,837	1,075	388	158	216	155	160	232	135
1904–1905	1,887	2,042	1,724	1,112	347	188	240	163	152	190	110
1905–1906	2,074	2,237	2,054	1,274	407	120	253	190	197	229	161
1906–1907	2,491	2,681	2,456	1,322	667	186	281	225	222	271	180
1907–1908	2,764	2,989	2,742	1,540	740	208	254	247	240	290	194
1908–1909	3,440	3,687	3,435	2,370	632	158	275	252	264	321	217

REPORT OF THE PATHOLOGIST AND BACTERIOLOGIST

To the Superintendent:

The following represents the laboratory work from October 1, 1908, to September 30, 1909.

Eighteen autopsies have been performed. The subjoined list gives the most interesting lesions found:

Abscess of brain	1
Atheroma of aorta	4
Carcinomatosis, abdominal	1
Chronic passive congestion of kidneys	1
Chronic passive congestion of liver	1
Chronic passive congestion of lungs	1
Chronic passive congestion of spleen	1
Dissecting aneurism of aorta	1
Endarteritis of vessels of brain	1
Encephalitis (chronic)	1
Endocarditis (chronic)	3
Enteritis (ulcerative)	1
Hematoma (mediastinal and sub-peritoneal)	1
Hemoperitoneum	1
Hemothorax	1
Hypertrophy of retro-peritoneal lymph glands	1
Intussusception of ileum,	1
Myocarditis (chronic)	1
Nephritis (parenchymatous)	1
Passive congestion of viscera	1
Peritonitis	2
Tuberculosis (pulmonary)	5

The following pathological reports have been made upon one hundred and eighty surgical specimens:

TUMORS.

Malignant.

Adeno-carcinoma of anus	1
Adeno-carcinoma of appendix	1
Adeno-carcinoma of colon	2
Adeno-carcinoma of kidney	1
Adeno-carcinoma of liver	1
Adeno-carcinoma of lymph gland	1
Adeno-carcinoma of nose	1
Adeno-carcinoma of ovary	1
Adeno-carcinoma of sigmoid	2
Carcinomatosis (general metastases)	1
Carcinoma of breast (scirrhus)	8
Carcinoma of cervix	1
Carcinoma of glands (metastases)	1
Carcinoma of rectum	1
Carcinoma of skin	1
Epithelioma of cervix	2
Epithelioma of face	4
Epithelioma of inguinal glands	1
Epithelioma of jaw	3
Epithelioma of lip	2
Epithelioma of neck	1
Epithelioma of penis	1
Epithelioma of skin	2
Epithelioma of vulva	1
Myxo-sarcoma	1
Osteo-sarcoma	1
Papilloma of bladder	2
Sarcoma of axilla	1
Sarcoma of face (round cell)	1
Sarcoma of face (spindle cell)	2
Sarcoma of femur (round cell)	1
Sarcoma of jaw (giant cell)	1
Sarcoma of neck	1
Sarcoma of parotid	2
Sarcoma of testicle	1
Sarcoma of thigh	1

Benign.

Chondroma	1
Cystic breast	1

Cystic kidney	1
Cystic testicle	1
Fibro-adenoma of breast	6
Fibroma of uterus	2
Multilocular cystoma	2
Multilocular papillo-cystoma	1
Myoma of uterus	11
Osteoma	1
Ovarian cyst	5
Ovarian cyst (dermoid)	2
Parovarian cyst	1
Papilloma of cheek	1
Sebaceous cyst	3

Tuberculous.

Tuberculosis of appendix	1
Tuberculosis of epididymis	3
Tuberculosis of hydrocele of cord	1
Tuberculosis of intestines	1
Tuberculosis of kidney	5
Tuberculosis of lung	4
Tuberculosis of lymph glands (adenitis)	12
Tuberculosis of ovary	1
Tuberculous orchitis	3
Tuberculous osteomyelitis	1
Tuberculous salpingitis	4

Inflammatory.

Appendicitis (acute)	14
Appendicitis (chronic)	25
Cervicitis	3
Chancre	1
Cholecystitis (chronic)	1
Endometritis	6
Inflammatory tissue, anus	1
Inflammatory tissue, parotid	1
Inflammatory tissue, tonsil	1
Inflammatory tissue, umbilicus	1
Inflammatory tissue, urethral caruncle	1
Nephritis (chronic interstitial)	1
Nephritis (chronic parenchymatous)	1
Oöphoritis	3
Osteomyelitis	2
Pancreatitis	1

Peripancreatic hemorrhage	1
Pyelo-nephritis	1
Salpingitis (acute)	1
Salpingitis (chronic)	3

Miscellaneous.

Bartholin's gland, cyst of	1
Brain abscess	1
Broncho-pneumonia	1
Cellulitis (acute)	1
Cervical polyp	1
Congestion (chronic passive) of kidney	4
Congestion (chronic passive) of liver	3
Congestion (chronic passive) of spleen	3
Ectopic pregnancy	2
Encephalitis	1
Endarteritis	1
Goitre (colloid)	2
Goitre (cystic)	2
Goitre (exophthalmic)	2
Hydatidiform mole	2
Hypertrophy of lymph glands	7
Hypertrophy of prostate	6
Polyp of intestines	1
Polyp of labium majus	1
Polyp of rectum	1
Retained placenta	2
Syphilitic granulomata	1
Syphilitic ulcer of scalp	1
Tonsilitis (chronic)	1

In addition to the above, the following clinical work has been done:

CLINICAL EXAMINATIONS.

Urine Analyses.

Analyses routine	6,019
Examinations for acetone and diacetic acid	16
Examinations for tubercle bacilli	6
Quantitative estimations of albumen,	4
Quantitative estimations of sugar	29
Quantitative estimations of urea	31
Indican reaction	22

Blood Examinations.

Differential counts	91
Estimation of hemoglobin	333
Estimation of red blood cells	76
Estimation of white blood cells	814
Examinations for malarial parasites	17
Widal reactions	113
Coagulation time	30

General Examinations.

Examinations of bacteriological cultures	378
Examination of feces	93
Examination of smears	88
Examination of sputum	555
Examination of transudates and exudates	7
Gastric analyses	97

Respectfully submitted,

WILFRED E. ROUNSEVILLE,
Resident Pathologist and Bacteriologist.

REPORT OF X-RAY DEPARTMENT

To the Superintendent:

The following represents the work of the X-ray department for the year ended September 30, 1909.

Two hundred and fifty-four radiographs have been taken.

The following represents the results obtained:

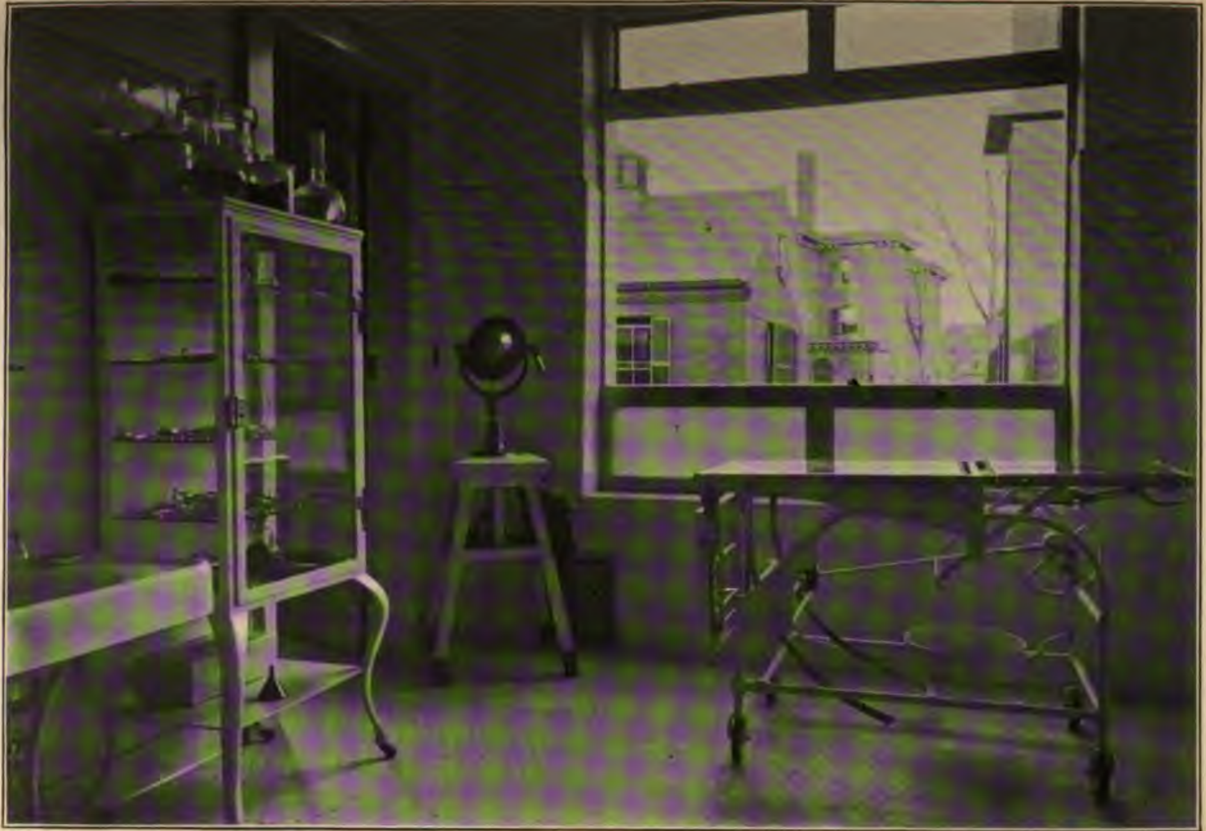
Acute synovitis	1
Ankylosis of elbow	1
Ankylosis of knee	1
Ankylosis of shoulder	3
Bullet in chest	2
Bullet in foot	2
Bullet in head	3
Bullet in shoulder	1
Cavity in lungs	2
Cholelithiasis	4
Chronic synovitis	2
Colon, containing bismuth subnitrate	2
Congenital absence of heads of both femurs	1
Congenital dislocation of hip	6
Deformed foot due to paralysis	2
Detached semiluna cartilage	2
Dislocation of clavicle	1
Dislocation of elbow	1
Dislocation of shoulder	1
Exostosis of big toe	2
Exostosis of metacarpals	1
Epiphyseal separation of head of radius	2
Foreign body in eye (steel)	2
Fractures of clavicle	2
Fractures Colles's	4
Fractures of femur	14
Fractures of fibula	3
Fractures of humerus	11
Fractures of metacarpals	4
Fractures of metatarsals	6
Fracture of olecranon	1
Fracture of patella	1
Fractures of phalanges	1
Fractures of radius	2
Fracture of radius and ulna	1
Fractures, Pott's	4

Fracture of spine	1
Fractures of tibia	8
Fractures of tibia and fibula	10
Hydronephrosis	3
Infectious arthritis of hands	1
Infectious arthritis of knees	1
Infected knees	2
Needle in hand	5
Needle in foot	1
Needle in forearm	1
Neoplasm of intestines	1
Normal ankle	2
Normal bladder	3
Normal elbow	1
Normal foot	7
Normal hand	2
Normal hip	2
Normal humerus	1
Normal kidney (suspected renal calculus)	31
Normal knee	17
Normal pelvis	2
Normal sacro-iliac joint	1
Normal spine	4
Normal shoulder	7
Normal thorax	4
Normal tibia	2
Normal wrist	1
Osteomyelitis	3
Periostitis of femur	2
Periostitis of fibula	1
Periostitis of tibia	1
Pott's disease	1
Psoas abscess	1
Sarcoma of tibia	1
Sarcoma of femur	1
Talipes equinus	1
Talipes varus	1
Tuberculosis of hip	4
Tuberculosis of knee	13
Tuberculosis of shoulder	1
Vesicle calculus	3
Total	254

Respectfully submitted,

WILFRED E. ROUNSEVILLE,
House Radiographer.

UofR



THE ERWIN OPERATING ROOMS

TABLES OF DISEASES, INJURIES, ETC.,

TREATED IN THE

HARTFORD HOSPITAL

During the Year Ended September 30, 1909.

MEDICAL CASES.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Diseases of the Blood and Ductless Glands.								
Anæmia, pernicious, ...	..	2	..	..	..	..	2	1
Anæmia, secondary, ...	..	..	1	..	1	..	..	1
Anæmia, splenic, ...	..	1	..	..	1	..	..	..
Goitre, exophthalmic, ...	1	..	2	2	1	..	..	..
Goitre, cystic, ...	..	1	2	1	2	..	..	..
Goitre, colloid, ...	..	..	3	2	1	..	..	..
Hodgkin's disease, ...	..	..	1	..	..	..	1	..
Leukemia, lymphatic, ...	..	1	..	..	..	..	1	1
Purpura, Henock's, ...	..	..	..	..	..	..	..	1
Total,	1	5	9	5	6	..	4	4
Diseases of Circulatory System.								
Angina pectoris, ...	..	1	..	..	1	..	..	..
Arterio-sclerosis, ...	1	8	2	..	6	2	3	1
Endocarditis, acute, ...	2	..	4	..	4	1	1	..
Endocarditis, chronic, ...	1	19	19	..	29	2	8	3
Myocarditis, acute, ...	..	2	1	..	..	..	3	..
Myocarditis, chronic, ...	1	5	2	..	6	1	1	..
Pericarditis, ...	..	1	2	..	2	1	..	..
Phlebitis, ...	1	1	2	4	..	..	..	..
Total,	6	37	32	4	48	7	16	4

MEDICAL CASES—Continued.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Constitutional Diseases.								
Arthritis, atrophic,	1	..	1	..	2	..	..	..
Arthritis, deformans,	3	1	1	..	2	1	2	1
Arthritis, hypertrophic,	..	..	2	..	2	..	..	..
Diabetes mellitus,	..	2	8	1	4	2	3	..
Marasmus,	1	3	5	3	2	2	2	7
Rhachitis,	1	3	2	2	4	..	..	..
Rheumatism,	..	3	3	2	4	..	..	2
Total,	6	12	22	8	20	5	7	10
Cutaneous Diseases.								
Dermatitis, Medicamentosa,	1	..	..	1	..	..	..	..
Eczema,	..	8	3	6	5	..	..	3
Elephantiasis,	1	..	..	..	1	..	..	..
Furunculosis,	..	2	3	5	..	..	..	..
Impetigo contagiosa,	..	..	4	4	..	..	..	..
Psoriasis,	..	..	1	..	1	..	..	..
Tinea sycosis,	..	1	..	1	..	..	..	..
Scleroderma,	1	..	..	..	1	..	..	..
Urticaria,	..	..	2	2	..	..	..	..
Total,	3	11	13	19	8	..	..	3
Diseases due to Animal Parasites.								
Ascaris lumbricoides,	..	1	1	2	..	..	..	..
Dibothriocephalus latus,	..	..	1	1	..	..	..	..
Taenia saginata,	..	..	2	2	..	..	..	1
Total,	..	1	4	5	..	..	..	1
Diseases of the Digestive System.								
Cholangitis,	..	2	2	4	..	..	..	1
Colitis,	..	2	2	2	2	..	..	1
Constipation,	..	9	4	7	6	..	..	1
Enteritis,	1	3	2	5	1	..	..	..
Gastritis,	..	11	4	11	3	..	1	..
Gastric neurosis,	..	9	3	3	8	1	..	..
Gastro-enteritis,	..	8	4	9	3	..	..	1
Hyperchlorhydria,	..	2	1	1	2	..	..	..
Indigestion, acute	..	1	2	1	2	..	..	..
Intestinal intoxication,	1	2	1	4	..	..	..	..
Liver, hypertrophic cirrhosis of,	..	2	4	..	3	..	3	..
Total,	2	51	29	47	30	1	4	4

MEDICAL CASES — CONTINUED.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Infectious Diseases.								
Diphtheria,	5	37	34	70	1	..	5	1
Erysipelas,	..	9	6	13	..	..	2	1
Infectious arthritis,	..	2	2	3	1	..	..	..
Influenza,	..	20	11	25	6	..	..	..
Malaria,	..	5	4	9	..	..	..	..
Meningitis, cerebro-spinal,	..	2	4	1	..	..	5	..
Meningitis, tuberculous,	..	1	1	..	..	..	2	..
Pertussis,	..	2	2	4	..	..	..	..
Rheumatic fever, acute,	..	6	10	11	4	1	..	1
Rheumatism, gonorrheal,	..	2	1	1	2	..	..	1
Rubeola,	..	3	2	5	..	..	..	..
Scarlet fever,	2	15	12	25	..	..	4	4
Septicæmia,	..	..	3	..	..	..	3	..
Syphilis,	1	13	8	4	16	1	1	3
Tetanus,	..	8	..	2	..	..	6	..
Typhoid fever,	18	24	10	48	2	..	2	15
Varicella,	..	1	1	2	..	..	..	..
Total,	26	150	111	223	32	2	30	26
Intoxications.								
Alcoholism, acute,	1	51	6	46	10	..	2	1
Alcoholism, chronic,	..	6	2	1	6	1	..	..
Carbolic acid poisoning,	..	1	1	..	..	..	2	..
Delirium tremens,	..	8	2	6	3	..	1	..
Gas poisoning,	..	2	1	2	..	..	1	..
Heat exhaustion,	..	5	..	3	..	..	2	..
Laudanum poisoning,	..	1	1	2	..	..	..	..
Morphinism,	..	5	2	1	5	1	..	..
Morphine poisoning,	..	2	1	2	..	..	1	..
Ptomaine poisoning,	..	3	..	3	..	..	..	..
Strychnine poisoning,	..	1	..	1	..	..	..	..
Total,	1	85	16	67	24	2	9	1
Diseases of the Kidneys.								
Cystic kidney,	..	..	4	2	2	..	..	..
Hypernephroma,	..	4	1	2	1	2	..	..
Hydronephrosis,	..	2	1	1	1	1	..	..
Nephritis, acute,	..	7	2	3	4	1	1	..
Nephritis, chronic,	..	12	9	..	11	3	7	..
Nephrolithiasis,	..	5	3	5	1	2	..	1
Nephroptosis,	..	..	12	9	2	1	..	..
Pyonephrosis, septic,	..	3	3	3	1	..	2	..
Pyonephrosis, tuberculous,	..	..	4	2	1	..	1	1
Renal colic,	..	3	..	2	1	..	..	..
Total,	..	36	39	29	25	10	11	2

MEDICAL CASES—Continued.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Diseases of Nervous System.								
Anterior poliomyelitis,	..	3	2	..	3	2	..	..
Cerebral hemorrhage,	7	9	5	..	6	3	12	4
Chorea (Sydenham's),	..	1	..	1	..	..	..	..
Dementia, senilis,	1	1	4	..	..	4	2	..
Epilepsy,	1	3	1	..	4	1	..	..
Exhaustion,	2	5	5	6	6	..	..	..
Gumma of brain,	..	1	..	..	1	..	..	..
Hypochondriasis,	1	..	..	..	1	..	..	..
Hysteria,	..	2	4	2	4	..	..	..
Insanity, periodic,	..	..	2	1	1	..	..	..
Locomotor ataxia,	..	3	1	..	4	..	..	..
Melancholia,	..	3	..	..	1	1	1	..
Neurasthenia,	..	10	17	9	14	4	..	..
Neuritis, alcoholic,	1	..	..	..	1	..	..	..
Neuritis, lead poisoning,	..	..	..	..	..	.	..	1
Neuritis, post meningitic,	1	..	..	..	1	..	..	1
Neuritis, sciatica,	..	2	..	..	2	..	..	..
Neuritis, traumatic,	..	..	1	..	1	..	..	..
Neuro-fibromatosis,	..	..	1	..	1	..	..	..
Neurosis, traumatic,	..	1	..	1	..	..	..	..
Paralysis, Bell's,	..	3	..	2	1	..	..	1
Paralysis, spastic,	..	1	..	..	1	..	..	..
Paraplegia,	3	..	..	..	2	1	..	1
Trifacial neuralgia,	..	2	2	2	2	..	..	..
Total,	17	50	45	24	57	16	15	8
Diseases of Muscles.								
Myalgia,	..	2	3	3	2	..	..	..
Diseases of the Respiratory System.								
Abscess of lung,	..	2	..	1	1	..	..	..
Asthma,	..	2	2	..	4	..	..	..
Bronchitis, acute,	..	9	4	11	2	..	..	2
Bronchitis, chronic,	..	7	3	3	7	..	..	..
Carcinoma of lung,	..	..	1	..	..	..	1	.
Empyema,	..	3	..	2	..	..	1	1
Oedema of lungs, acute,	..	2	1	..	..	..	3	..
Pleurisy, dry,	1	5	4	8	2	..	..	..
Pleurisy, with effusion,	..	3	2	4	1	..	..	2
Pneumonia, broncho,	..	17	6	14	1	1	7	2
Pneumonia, lobar,	..	33	15	28	5	..	15	..
Pulmonary embolus,	..	1	..	..	..	..	1	..
Pulmonary tuberculosis,	57	125	66	5	91	79	73	75
Pyo-pneumothorax,		3	1	..	..	..	4	..
Total,	58	212	105	76	114	80	105	82

MEDICAL CASES—CONTINUED.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Obstetrical Cases.								
Abortion, incomplete,	..	..	27	27	..	..	..	1
Abortion, threatened,	..	..	3	3	..	..	..	.
Ectopic gestation,	..	..	9	8	..	..	1	..
Hydatidiform mole,	..	..	2	1	..	..	1	..
Hyperemesis gravidarum,	..	..	6	5	1	..	..	..
Incarcerated pregnant uterus,	..	..	1	1	..	..	..	..
Miscarriage,	..	..	13	11	2	..	..	..
Placenta previa,	..	..	3	1	..	1	1	..
Pregnancy,	12	..	141	140	4	9	..	9
Puerperal septicemia,	..	..	1	..	..	..	1	..
Subinvolution of uterus,	..	..	1	..	1	..	..	..
Total,	12	..	207	197	8	10	4	10
Unclassified and no Disease.								
No diagnosis,	1	4	2	6	..	..	1	..
No disease (boarder),	2	18	10	30	..	..	..	1
Senility,	2	1	1	..	2	1	1	4
Total,	5	23	13	36	2	1	2	5

SUMMARY OF MEDICAL CASES.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Blood and ductless glands, ...	1	5	9	5	6	0	4	4
Circulatory system, ...	6	37	32	4	48	7	16	4
Constitutional, ...	6	12	22	8	20	5	7	10
Cutaneous, ...	3	10	13	18	8	0	0	3
Animal parasites, ...	0	2	4	6	0	0	0	1
Digestive system, ...	2	51	29	47	30	1	4	4
Infectious diseases, ...	26	150	111	223	32	2	30	26
Intoxications, ...	1	85	16	67	24	2	9	1
Kidneys, ...	0	36	39	29	25	10	11	2
Nervous system, ...	17	50	45	24	57	16	15	8
Muscles, ...	0	2	3	3	2	0	0	0
Respiratory system, ...	58	212	105	76	114	80	105	82
Obstetrics, ...	12	207	207	197	8	10	4	10
Unclassified, ...	5	23	13	36	2	1	0	5
Total, ...	137	675	648	743	376	134	205	160
Births, ...	..	68	74	..	..	..	..	..
Total, ...	137	743	722	743	376	134	205	160

WILBUR L. LeCRON,
House Physician.

SURGICAL CASES.

DISEASES OF HEAD AND NECK.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Abscess of brain, ...	..	2	..	..	..	..	2	..
Abscess of lip, ...	..	1	..	1	..	..	..	..
Abscess of neck, ...	..	4	2	6	..	..	..	..
Alveolar abscess, ...	..	6	4	10	..	..	..	1
Angioma of lip, ...	..	1	2	3	..	..	..	..
Bullet wound of head, ...	..	3	..	1	..	..	2	..
Carbuncle of neck, ...	..	2	..	..	..	1	1	..
Carcinoma of face, ...	2	4	4	6	3	..	1	1
Carcinoma of jaw, ...	..	6	..	3	1	2	..	..
Carcinoma of neck, ...	..	7	1	5	2	..	1	..
Carcinoma of tongue, ...	..	3	..	..	..	1	2	..
Concussion of brain, ...	1	1	..	1	1	..	..	..
Contusion of scalp, ...	..	3	1	3	..	1	..	..
Cut throat, ...	..	2	1	2	1	..	..	..
Cystic tumor of neck, ...	..	..	1	1	..	..	..	..
Epulis, ...	..	..	3	2	1	..	..	..
Foreign body in œsophagus, ...	..	3	..	3	..	..	..	..
Fracture of jaw, ...	..	1	1	..	2	..	..	..
Fracture of skull—base, ...	1	8	1	1	2	1	6	..
Fracture of skull—vault, ...	..	2	1	2	..	..	1	..
Gummata of scalp, ...	..	1	..	1	1	..	..	..
Hare-lip, ...	..	3	2	5	..	..	..	1
Lacerated wounds of face, ...	..	11	3	11	3	..	..	..
Lacerated wounds of scalp, ...	..	9	3	10	2	..	..	..
Mixed tumor of parotid, ...	..	..	1	1	..	..	..	..
Osteomyelitis of jaw, ...	..	2	2	2	2	..	..	..
Sarcoma of jaw, ...	..	..	1	..	..	..	1	..
Sarcoma of neck, ...	..	2	..	..	2	..	..	..
Sebaceous cyst of scalp, ...	..	2	..	2	..	..	..	..
Stricture of œsophagus, ...	..	2	..	1	1	..	..	..
Torticollis, ...	..	1	1	..	2	..	..	..
Tuberculous glands of neck, ...	..	12	13	21	3	1	..	..
Tuberculous ulcer of scalp, ...	..	1	..	..	1	..	..	..
Total, ...	4	108	51	107	32	7	17	3

DISEASES OF EYE, EAR, NOSE AND THROAT (INDOOR).

	Under treatment Sept. 30, 1908.	New cases admitted		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Adenoids,	..	22	17	39	..	..	..	..
Adenoids and hypertrophied tonsils,	3	156	144	303	..	..	..	1
Blepharitis,	.	..	1	1	..	..	..	..
Carcinoma of nares,	..	..	1	..	..	1	..	1
Cataract,	..	7	2	6	3	..	..	..
Cellulitis of orbit,	..	1	..	..	1	..	..	.
Chalazion,	..	1	1	2	..	..	..	..
Cleft palate,	..	3	..	2	..	1	.	..
Conjunctivitis, acute,	..	3	5	6	2	..	..	1
Corneal ulcer,	..	8	1	4	5	..	..	2
Crushed and lacerated eyeball,	..	8	..	6	1	1	..	..
Dacrocystitis,	..	2	..	2	..	..	..	..
Deviated nasal septum,	..	4	..	3	..	1	..	..
Entropion,	..	1	1	2	..	..	..	..
Epistaxis,	..	2	1	3	..	..	..	..
Epithelioma of nose,	..	1	..	1	..	..	..	..
Foreign body in eye,	..	3	..	2	1	..	..	1
Fracture of nose,	..	2	1	2	1	..	..	..
Frontal sinusitis,	..	1	1	2	..	..	..	..
Granulomata of mouth,	..	2	..	..	1	1	..	..
Glaucoma,	1	4	3	6	2	..	..	..
Hemorrhage, subconjunctival,	..	1	..	1	..	..	..	..
Iritis,	2	4	2	6	2	..	..	2
Keratitis,	..	3	..	2	1	..	..	..
Laryngitis, chronic,	..	2	..	..	2	..	..	..
Mastoiditis,	1	4	4	7	2	..	..	..
Ophthalmia, gonorrheal,	..	4	4	7	1	..	..	..
Otitis media, acute,	..	5	3	6	2	..	..	..
Otitis media, chronic,	..	2	..	2	..	..	..	..
Pharyngitis, luetic,	..	2	1	3	..	..	..	..
Polyp of auditory canal,	..	1	1	2	..	..	..	..
Pterygium,	..	1	..	1	..	..	..	..
Retina, detached,	..	1	1	..	2	..	..	..
Sarcoma of orbit,	..	..	1	..	..	1	..	..
Strabismus,	..	2	1	2	1	..	..	..
Tonsillitis, follicular,	..	15	14	25	4	..	..	..
Tonsillitis, suppurative,	..	5	3	6	2	..	..	..
Trachoma,	..	1	1	1	1	..	..	..
Tuberculous laryngitis,	1	..	..	..	..	..	1	..
Ulcer of nares,	..	1	..	..	1	..	..	..
Unobliterated thyroglossal duct,	..	1	..	1	..	..	..	..
Wound of eyelid,	..	3	2	5	..	..	..	..
Total,	8	289	217	469	38	6	1	8

DISEASES OF THE THORAX.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Carcinoma of breast,	1	1	12	5	8	1	..	1
Cystic tumor of breast,	..	..	3	3	..	..	..	..
Fibroma of breast,	..	..	4	4	..	..	..	..
Fracture of clavicle,	..	1	1	2	..	..	..	..
Fracture of ribs,	..	4	1	4	1	..	..	..
Gunshot wound of chest,	..	1	..	1	..	..	..	..
Lipoma of chest wall,	..	1	..	1	..	..	..	..
Mastitis,	2	..	4	6	..	..	..	1
Total,	3	8	25	26	9	1	..	2

DISEASES OF THE SPINE AND BACK.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Abscess of back,	..	..	1	..	1	..	..	..
Bullet wound of back,	..	1	..	1	..	..	..	..
Contusion of back,	..	4	3	6	1	..	..	1
Fracture of spine,	3	..	..	..	2	1	..	2
Lipoma of back,	..	1	1	2	..	..	..	..
Lumbago,	..	..	4	3	1	..	..	..
Osteomalacia,	..	2	..	2	..	..	..	..
Pott's disease,	2	2	2	..	4	1	1	2
Psoas abscess,	..	1	1	1	1	..	..	1
Scoliosis,	1	4	..	..	4	1	..	..
Subluxation sacro-iliac synchondrosis,	1	1	..	2	..	..	..	..
Total,	7	16	12	17	14	3	1	6

DISEASES OF THE ABDOMEN.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatmen Sept. 30, 1909.
		Male.	Female.					
Abdominal wall, abscess of,	..	1	1	1	1	..	..	..
Adhesions foll. appendectomy,	..	1	..	1	..	..	..	.
Appendicitis,	11	119	148	267	9	2	..	16
Appendicitis, with gen. peritonitis,	1	10	7	13	2	..	3	..
Aneurism abdominal aorta,	..	..	1	..	..	..	1	.
Carcinomatosis,	..	..	3	..	..	2	1	1
Carcinoma of bile duct,	..	..	1	..	1	..	..	..
Carcinoma of intestine,	..	2	1	1	..	..	2	..
Carcinoma of liver,	..	4	1	..	..	2	3	..
Carcinoma of pancreas,	..	2	..	..	2	..	..	..
Carcinoma of sigmoid,	..	..	3	..	..	1	2	1
Carcinoma of stomach,	2	10	4	..	3	8	5	3
Cholecystitis,	..	5	3	7	..	..	1	..
Cholelithiasis,	2	7	30	28	8	1	2	2
Duodenal ulcer,	..	2	..	..	2	..	..	..
Diverticulitis,	..	1	..	1	..	..	..	..
Diverticulum, Meckel's, with gen. peritoni's,	..	1	..	..	..	..	1	
Extraperitoneal abscess,	1	..	..	1	..	..	..	..
Fecal fistula foll. appendectomy,	1	..	..	1	..	..	..	2
Gastric ulcer,	..	8	3	5	5	1	..	..
Hernia, femoral,	2	1	7	10	..	..	..	..
Hernia, inguinal,	4	56	9	69	..	..	..	1
Hernia, inguinal, strangulated,	1	5	..	6	..	..	..	..
Hernia, umbilical,	..	1	3	2	2	..	..	..
Hernia, mesenteric,	..	1	..	..	1	..	..	..
Hernia, ventral,	..	5	11	16	..	..	..	..
Hernia, ventral, strangulated,	..	1	1	2	..	..	..	..
Intestinal hemorrhage,	..	1	..	1	..	..	..	..
Intestinal obstruction,	..	2	2	3	..	..	1	..
Intussusception,	..	2	1	3	..	..	..	.
Peritonitis, general,	..	7	6	3	1	..	9	2
Peritonitis, traumatic,	1	..	..	..	..	..	1	..
Peritonitis, tuberculous,	..	2	..	..	..	..	2	1
Pancreatitis, chronic,	..	1	2	1	1	..	1	..
Tuberculosis, intestine,	..	1	..	..	1	..	..	1
Tuberculosis, mesenteric glands,	..	..	1	..	..	1	..	..
Total,	26	259	249	442	39	18	35	30

GYNECOLOGICAL DISEASES.

	Under treatment Sept. 30, 1908.	New cases admitted.	Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Female.					
Bartholin's glands, abscess of, . . .	..	3	3	..	..	..	..
Bartholin's glands, cyst of, . . .	..	1	1	..	..	..	..
Cervix and perineum, laceration of, .	1	59	55	5	..	..	2
Cervix, laceration of, ...	..	10	8	2	..	..	1
Cervix, stenosis of, ...	..	1	1	..	..	..	..
Cellulitis, pelvic, ...	..	13	11	2	..	..	..
Dysmenorrhoea, ...	..	5	5	..	..	..	..
Endometritis, ...	2	45	44	3	..	..	2
Labium, carcinoma of, ...	..	1	..	1	..	..	..
Labium, lipoma of, ...	..	1	1	..	..	..	..
Menorrhagia, ...	..	6	5	1	..	..	..
Oöphoritis, chronic, ...	..	2	2	..	..	..	..
Ovary, cyst of, ...	3	25	28	..	..	..	..
Ovary, adeno carcinoma of, ...	..	1	1	..	..	..	..
Ovary, papillo-cystoma of, . . . ,	..	4	1	1	..	2	1
Pelvic peritonitis, ...	..	3	3	..	..	..	1
Perineum, laceration of, ...	..	5	5	..	..	..	..
Recto-vaginal fistula, ...	1	..	1	..	..	..	..
Salpingitis, ...	..	27	23	4	..	..	1
Salpingitis. tuberculous, ...	..	4	3	1	..	..	..
Salpingitis with general peritonitis, .	..	3	2	..	..	1	..
Uterus, carcinoma of, ...	1	11	3	4	5	..	4
Uterus, fibroid of, ...	1	24	22	2	1	..	3
Uterus, polyp of, ...	1	2	2	1	..	..	..
Uterus, prolapse of, ...	2	8	10	..	..	..	..
Uterus, malposition of, ...	1	5	3	3	..	..	..
Vaginitis, gonorrhœal, ...	..	2	2	..	..	..	..
Vagina, metastatic carcinoma of, . .	..	2	1	1	..	..	.
Vesico-vaginal fistula, ...	..	1	1	..	..	..	..
Total, ...	13	274	247	31	6	3	15

DISEASES OF GENITO-URINARY TRACT.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Adenitis inguinal,	..	4	..	4	..	..	..	1
Acute retention of urine,	..	4	..	4	.	..	..	..
Calculus, vesicle,	..	2	..	2	..	..	..	..
Chancroids,	..	8	..	7	1	..	..	..
Cryptorchidism,	.	5	..	5	..	..	..	..
Cystitis, acute,	1	2	4	5	1	1	.	..
Cystitis, chronic,	..	1	1	1	1	..	..	1
Cystitis, tuberculous,	..	1	..	..	1	..	..	..
Epididymitis,	..	13	..	11	2	..	..	..
Gonorrhœa, acute,	1	16	3	15	5	..	..	2
Gonorrhœa, chronic,	..	15	..	4	11	..	..	1
Herpes prepucialis,	..	1	..	1	..	..	..	..
Hydrocele,	..	10	..	10	..	..	..	..
Hypospadias,	..	2	..	..	1	1	..	..
Orchitis, tuberculous,	..	6	..	5	1	..	..	..
Papilloma of bladder,	..	1	2	2	1	..	..	..
Papilloma of urethra,	..	..	1	1	..	..	..	..
Paraphimosis,	..	3	..	2	1	..	..	1
Periurethral abscess,	..	1	..	1	..	..	..	..
Phimosis,	..	10	..	9	1	..	..	..
Prostatitis, acute,	..	1	..	1	..	..	..	..
Prostate, carcinomatous,	..	2	..	1	1	..	..	1
Prostate, hypertrophied,	4	16	..	15	4	..	1	3
Prostate, sarcomatous,	..	1	..	..	1	..	..	..
Prostate, tuberculous,	..	1	..	..	1	..	..	..
Sarcoma of testicle,	..	1	..	1	..	..	..	..
Seminal vesciculitis,	..	1	..	1	..	..	..	..
Stricture of urethra,	..	10	..	8	2	..	..	..
Varicocele,	..	13	..	11	2	..	..	2
Total,	6	151	11	127	38	2	1	12

DISEASES OF RECTUM AND ANUS.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Carcinoma of rectum,	..	1	3	..	1	1	2	..
Fissure in ano,	..	7	1	8	..	..	..	..
Fistula in ano,	..	16	8	23	1	..	..	1
Hemorrhoids,	2	40	14	56	..	..	..	3
Imperforated rectum,	..	1	..	1	..	..	..	..
Ischio-rectal abscess,	..	7	3	10	..	..	..	..
Pilo-nidal sinus,	..	2	1	3	..	..	..	..
Prolapse of rectum,	1	..	1	2	..	..	..	..
Rectal polypus,	..	..	1	1	..	..	..	..
Tumor of rectum,	..	1	..	..	1	..	..	..
Stricture of rectum,	..	..	1	1	..	..	..	..
Total,	3	75	33	105	3	1	2	4

DISEASES OF UPPER EXTREMITY.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Abscess, axillary,	..	1	2	3	..	..	..	..
Amputation of fingers (traumatic),	..	2	..	1	1	..	..	..
Angioma, shoulder,	..	..	1	1	..	..	..	..
Ankylosis, shoulder,	..	2	2	1	3	..	..	..
Burns, hands and arms,	..	5	3	6	2	..	..	1
Contracture, Dupuytren's,	..	1	1	..	2	..	..	..
Dislocation of elbow,	..	3	1	2	2	..	.	..
Dislocation of shoulder,	..	7	2	8	1	..	.	..
Epiphyseal separation, radius,	..	1	..	..	1	..	.	..
Epithelioma of arm,	..	1	..	1	..	..	..	..
Foreign body in hand, needles, etc.,	..	3	5	6	2	..	..	..
Fracture of clavicle,	..	2	1	2	1	..	..	..
Fracture, Colles's,	1	4	2	6	1	..	..	..
Fracture of fingers, compound,	..	3	1	2	2	..	..	..
Fracture of humerus,	..	4	3	5	2	..	..	..
Fracture of radius and ulna,	..	4	1	3	2	..	..	..
Infected fingers,	..	14	5	15	4	..	..	1
Infected hands,	2	15	6	18	5	..	..	2
Lacerations and contusions, hand,	..	14	6	15	5	..	..	..
Laceration, shoulder,	1	2	2	5	..	..	..	..
Lipoma, shoulder,	..	1	..	1	..	..	..	.
Sarcoma, axilla,	..	1	..	..	1	..	.	..
Scar, contracture from burn,	..	1	1	1	1	..	..	..
Severed tendons,	..	4	2	5	1	..	..	..
Total,	4	95	47	107	39	..	..	4

DISEASES OF LOWER EXTREMITY.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Abrasion of foot,	..	2	..	1	1	..	..	1
Abrasion of thigh,	..	1	.	1	..	..	..	..
Abcess of thigh,	..	2	4	6	..	..	..	..
Amputation of foot, traumatic,	..	1	..	..	1	..	..	..
Arthritis of knee (infectious),	..	4	2	3	3	..	..	..
Bullet wound of ankle,	..	1	..	1	..	..	..	..
Bursitis,	..	2	1	2	1	..	..	..
Contusions of leg,	..	1	1	2	..	..	..	..
Charcot's joint,	1	..	..	..	1	..	..	..
Dislocation of hip,	..	1	1	1	1	..	..	1
Exostosis of os calcis,	..	2	1	3	..	..	..	..
Femoral adenitis,	..	..	1	1	..	..	..	..
Floating cartilage of knee,	..	2	1	2	1	..	..	..
Fracture of astragulus, compound,	..	1	..	..	1	..	..	..
Fracture of foot,	2	3	..	4	1	..	..	..
Fracture of femur,	3	8	1	8	4	..	..	2
Fracture of fibula,	..	2	1	2	1	..	..	..
Fracture of hip,	..	..	1	..	1	..	..	..
Fracture of patella,	..	4	1	4	1	..	..	..
Fracture, Pott's,	1	4	1	4	2	..	..	..
Fracture of tibia,	1	5	1	4	3	..	..	2
Fracture of tibia, compound,	2	5	..	6	1	..	..	..
Fracture of tibia and fibula,	1	4	1	2	4	..	..	..
Frozen feet,	1	1	1	3	..	..	..	1
Hallux valgus,	..	1	1	2	.	..	..	..
Infected foot,	..	5	..	4	1	..	..	1
Infected leg,	..	3	..	3	..	..	..	..
Ingrowing toe-nail,	..	1	3	4	..	..	..	..
Lipoma of thigh,	..	1	..	1	..	..	..	..
Needle in foot,	..	1	1	2	..	..	..	..
Osteoma of femur,	..	1	..	1	..	..	..	..
Osteoma of tibia,	..	1	..	1	..	..	..	..
Osteomyelitis of femur,	..	4	..	2	1	1	..	..
Osteomyelitis of tibia,	..	6	..	2	4	..	..	..
Periostitis of astragalus,	..	1	..	..	1	..	..	..
Periostitis of tibia,	..	4	..	2	1	1	..	..
Pes planus,	..	5	2	3	3	1	..	..
Prepatellar bursitis,	..	2	..	2	..	..	..	..
Sarcoma of thigh,	..	4	3	3	3	1	..	..
Sebaceous cyst of thigh,	..	1	..	1	..	..	..	..
Severed tendo achillis,	..	1	..	1	..	..	..	..
Sinus of thigh,	..	1	..	1	..	..	..	..
Sprained ankle,	..	1	1	2	..	..	..	..
Stab wounds of leg,	..	2	..	2	..	..	..	..
Synovitis of knee,	..	3	..	2	1	..	..	..

DISEASES OF LOWER EXTREMITY — CONTINUED.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Talipes equino-varus,	..	3	1	2	2	..	..	..
Tuberculosis of hip,	..	4	1	1	4	..	..	..
Tuberculosis of knee,	1	6	2	4	5	..	..	..
Ulcer of foot, trophic,	..	2	1	2	1	..	..	..
Ulcer of foot, tuberculous,	..	1	..	.	1	..	..	..
Ulcer of leg, luetic,	..	1	..	1	..	..	..	..
Ulcer of leg, traumatic,	..	1	..	1	..	..	..	..
Varicose ulcer of leg,	2	7	3	9	3	..	..	2
Varicose veins,	..	6	3	2	7	..	..	..
Total,	15	136	42	123	66	4	..	10

MULTIPLE INJURIES.

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Burns,	1	8	3	7	2	..	3	..
Contusions,	..	5	2	6	..	..	1	..
Gunshot wounds,	..	3	1	2	..	..	2	..
Lacerations and contusions,	..	8	3	7	2	..	2	..
Stab wounds,	..	4	1	5	..	..	..	..
Total,	1	28	10	27	4	..	8	..

DISEASES OF EYE, EAR, NOSE AND THROAT (OUTDOOR).

	Male.	Female.
Adenoids,	2	1
Asthma,		1
Aural congestion,		2
Blepharitis,	10	10
Blepharospasm,		1
Cataract, senile,		1
Cataract, traumatic,	1	
Cerumen, impacted,	3	3
Chalazion,	1	
Corneal ulcer,	7	6
Conjunctival hemorrhage,	1	
Conjunctivitis, acute,	8	9
Conjunctivitis, chronic,	23	22
Conjunctivitis, phlyctenular,		1
Dacryocystitis,	3	6
Deviated septum,	17	4
Ectropion,		1
Entropion,		5
Epistaxis,	2	2
Ethmoiditis,	2	2
Hay fever,	1	1
Iritis,	1	
Keratitis,	2	2
Laryngitis, acute,	2	
Laryngitis, chronic,	3	2
Laryngitis, syphilitic,		1
Laryngitis, tuberculous,	1	
Middle turbinate, hypertrophy of,	3	
Nasal spur,	4	
Optic nerve, atrophy of,	1	
Otalgia,	1	
Otitis media, acuta,	2	4
Otitis media, chronica,	11	13
Otitis media, suppurativa,	4	2
Palpebral ptosis,	1	
Pharyngitis, chronic,	1	6
Post-nasal catarrh,	3	
Rhinitis, acute,	1	1
Rhinitis, atrophic,	3	2
Rhinitis, chronic,	7	4
Rhinitis, hypertrophic,	12	7
Tinnitus aurium,	2	1
Tonsillitis, follicular,	1	
Tonsils, hypertrophy of,	1	1
Trachoma,	1	1
Tympanum, rupture of,		1
Vocal cords, ulcer of,	1	
Total,	150	126

SUMMARY OF SURGICAL CASES (INDOOR).

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Diseases of head and neck, ...	4	108	51	107	32	7	17	3
Diseases of eye, ear, nose, and throat, .	8	289	217	469	38	6	1	8
Diseases of thorax, ...	3	8	25	26	9	1	0	2
Diseases of spine and back, ...	7	16	12	17	14	3	1	6
Diseases of abdomen, ...	26	259	249	442	39	18	37	30
Gynæcological diseases, ...	13	0	274	247	31	6	3	15
Diseases of genito-urinary tract, . .	6	151	11	127	38	2	1	10
Diseases of rectum and anus, ...	3	75	33	105	3	1	2	4
Diseases of lower extremities, ...	15	137	42	125	65	4	0	10
Diseases of upper extremities, ...	4	95	47	107	39	0	0	4
Multiple injuries, ...	1	28	10	27	4	0	8	0
Total, ...	90	1166	971	1799	312	48	70	92

SUMMARY OF SURGICAL CASES (INDOOR AND OUTDOOR).

	Under treatment Sept. 30, 1908.	New cases admitted.		Recovered.	Improved.	Unimproved.	Died.	Under treatment Sept. 30, 1909.
		Male.	Female.					
Total patients (indoor), ...	90	1166	971	1799	312	48	70	92
Total patients (outdoor), ...	..	150	126	....	..	..	..	..
Total, ...	90	1316	1097	1799	312	48	70	92

TABLE OF OPERATIONS.

OPERATIONS ON HEAD.

	Male.	Female.	Ether.	Nitrous oxide and ether.	Nitrous oxide.	Cocaine.	Chloroform.	No anæsthetic.
Asch's operation,	1	..	..	..	.	1	..	..
Canthotomy,	..	1	..	..	..	..	.	1
Cauterization nasal septum,	..	1	..	..	..	1	..	..
Curettage, alveolar abscess,	3	3	6	..	..	..	.	..
Enucleation of eye,	6	..	6	..	..	..	..	..
Excision adenoids,	34	33	62	5	..	.	..	..
Excision adenoids and tonsils,	127	125	235	16	..	1	..	..
Excision cataract,	1	1	..	..		2	..	..
Excision epithelioma, face,	1	..	..	..	..	..	..	1
Excision epithelioma, nose,	1	..	..	..	..	1	..	..
Excision epulis,	2	2	2	2	..	..	..	..
Excision lachrymal gland,	1	.	1	..		..	..	..
Excision mandible, partial,	1	..	1	..	..	..	..	..
Excision nævus,	..	1	1	..	..	..	..	..
Excision sebaceous cyst,	..	2	1	..	..	1	..	..
Excision senile mole,	1	..	1	..	..	..	..	..
Excision tonsils,	9	5	13	1	..	..	..	..
Excision ulcer of scalp,	1	..	..	..	..	1	..	..
Grattage,	..	1	1	..	..	..	..	..
Incision abscess postpinnal,	..	1	1	..	..	..	..	..
Incision cervical gland,	..	1	1	..	..	..	..	..
Incision neck (Ludwig's Angina),	3	..	1	1	1	..	..	..
Iridectomy,	3	2	..	..	..	5	..	..
Needling,	1	..	..	..	..	1	..	..
Operation for entropion,	1	1	1	..	..	1	..	..
Operation for mastoiditis,	4	5	9	..	..	..	..	..
Operation for strabismus,	1	1	..	..	..	2	..	..
Plastic on lip,	1	2	2	1	..	..	..	..
Plastic on palate,	1	..	1	..	..	..	..	..
Stilling's operation,	1	..	..	..	..	1	..	..
Suturing neck,	1	..	..	..	..	1	..	..
Suturing scalp,	1	..	..	..	..	..	..	1
Transplantation pterygium,	1	..	..	..		1	..	..
Trephination,	4	3	6	..		..	1	..
Turbinectomy,	1	..	..	..	..	1	..	..
Wiring fractured jaw,	..	1	1	..	..	..	..	..
Total,	213	192	353	26	1	21	1	3

OPERATIONS ON NECK.

	Male.	Female.	Ether.	Nitrous oxide and ether.	Nitrous oxide.	Cocaine.	Chloroform.	No anæsthetic.
Dilatation of œsophagus,	1	..	..	..	..	..	..	1
Excision epithelioma of jaw,	1	..	1	..	..	..	..	..
Excision glands of neck,	10	6	8	8	..	..	..	..
Incision glands of neck,	1	..	..	1	..	..	..	..
Ligation thyroid artery,	..	1	..	1	..	..	..	..
Operation for torticollis,	..	1	1	..	..	..	..	..
Removal foreign body from throat,	..	1	.	..	..	..	..	1
Thyroidectomy,	.	4	1	2	..	1	..	..
Tracheotomy,	1	..	..	..	..	..	..	1
Total,	14	13	11	12	..	1	..	3

OPERATIONS ON THORAX.

	Male.	Female.	Ether.	Nitrous oxide and ether.	Nitrous oxide.	Cocaine.	Chloroform.	No anæsthetic.
Amputation of breast,	..	11	9	2	..	..	..	..
Excision tumor of breast,	..	2	2	..	..	..	..	..
Excision glands of axilla,	1	1	2	..	..	..	..	..
Incision breast abscess,	..	2	1	..	1	..	..	..
Resection of rib,	7	1	1	1	4	1	1	..
Thoracentesis,	..	1	..	..	..	1	..	..
Total,	8	18	15	3	5	2	1	..

OPERATIONS ON ABDOMEN.

	Male.	Female.	Ether.	Nitrous oxide and ether.	Nitrous oxide.	Cocaine.	Chloroform.	No anæsthetic.
Appendectomy, ...	75	104	122	54	3	..	..	..
Appendicostomy, ...	1	..	..	1	..	..	..	..
Cholecystectomy, ...	..	2	2	..	..	..	..	..
Cholecystotomy, ...	3	12	8	5	1	1	..	..
Closure abdominal sinus, ...	2	..	1	1	..	..	..	..
Colostomy, ...	2	4	3	..	..	1	2	..
Cystotomy, suprapubic, ...	..	1	1	..	..	..	..	..
Drainage of abdominal cavity, . .	5	1	5	..	1	..	..	..
Drainage of appendical abscess, . .	8	12	18	2	..	..	..	..
Enteroenterostomy, ...	2	..	..	1	..	1	..	..
Enterostomy, ...	1	..	1	..	..	..	..	..
Excision gland of intestine, ...	..	1	1	..	..	..	..	..
Excision inguinal glands, ...	1	1	1	1	..	..	..	..
Excision Meckel's diverticulum, . .	2	..	1	1	..	..	..	..
Gastroenterostomy, ...	4	1	3	1	1	..	..	..
Herniotomy, femoral, ...	7	13	18	2	..	..	..	..
Herniotomy, inguinal, ...	41	1	26	16	..	..	..	..
Herniotomy, inguinal, strangulated, .	6	2	2	..	..	5	1	..
Herniotomy, umbilical, ...	1	2	1	1	..	1	..	..
Herniotomy, ventral, ...	4	2	2	4	..	..	..	..
Herniotomy, ventral strangulated, .	1	1	2	..	..	..	..	..
Intestinal anastomosis, ...	1	..	..	..	..	1	..	..
Laparotomy, exploratory, ...	10	12	14	4	1	1	..	2
Nephrectomy, ...	..	2	1	..	1	..	..	..
Nephrolithectomy, ...	2	1	1	2	..	..	..	..
Nephrotomy, ...	2	3	3	1	1	..	..	..
Nephropexy, ...	..	4	4	..	..	..	..	..
Reduction of intussusception, . . .	1	..	..	1	..	..	..	..
Total, ...	182	182	241	98	9	11	3	2

OPERATIONS—GYNECOLOGICAL.

	Male.	Female.	Ether.	Nitrous oxide and ether.	Nitrous oxide	Cocaine.	Chloroform.	No anæsthetic.
Amputation of cervix,	..	2	2	..	..	..	..	..
Cauterization of cervix,	..	1	1	..	..	..	..	.
Cœliotomy for abdominal pregnancy,	..	1	1	..	..	.	..	..
Colporrhaphy,	..	6	6	..	..	..	..	..
Curettage,	..	152	142	4	1	..	4	1
Excision of ovarian cyst,	..	1	1	..	..	..	..	..
Excision of growth on labia,	..	2	2	..	..	..	..	..
Exploratory laparotomy,	..	4	4	..	..	..	..	..
External Alexander,	..	1	1	..	..	..	..	..
Hemorrhoidectomy,	..	5	5	..	..	..	..	..
Hysterectomy,	..	8	8	..	.	..	..	..
Incision and curretting anal fistula,	..	1	1	..	..	..	..	..
Incision ovaries,	..	1	1	..	..	..	..	..
Incision of vulvo-vaginal abscess,	..	1	1	..	..	.	..	..
Intra-abdominal shortening of round ligament,	..	12	11	1	..	..	..	..
Morcellation,	..	1	1	..	..	..	..	..
Myomectomy,	..	1	1	..	..	..	..	..
Oöphorectomy,	..	5	4	1	..	..	..	..
Perineorrhaphy,	..	77	74	3	..	..	..	..
Removal of cervical polypus,	..	2	2	..	..	..	..	..
Removal of rectal polypus,	..	1	1	..	..	..	..	..
Repair of sphincter ani,	..	5	5	..	..	..	.	..
Salpingectomy, double,	..	9	9	..	..	..	..	..
Salpingectomy, single,	..	16	14	2	..	..		..
Trachelorrhaphy,	..	71	66	5	..	..	..	..
Vaginal section,	..	4	3	..		..	1	..
Ventral suspension,	..	7	7	..	..	..	..	..
Total,	..	397	374	16	1	..	5	1

OPERATIONS ON GENITO-URINARY TRACT.

	Male.	Female.	Ether.	Nitrous oxide and ether.	Nitrous oxide.	Cocaine.	Chloroform.	No anæsthetic.
Amputation of penis,	1	..	1	..	..	..	..	..
Circumcision,	9	..	5	3	1	..	..	..
Closure, vesical fistula,	1	..	..	..	1	..	.	..
Correction, undescended testicle,	3	..	3	..	..	..	..	..
Dilatation of urethra,	3	..	2	..	..	..	..	1
Epididymectomy,	2	..	2	..	..	..	..	..
Incision of perineal abscess,	1	..	1	..	..	..	..	..
Incision of buboes,	3	..	2	..	1	..	..	..
Orchidectomy,	3	..	3	..	..	..	..	..
Prostatectomy,	5	..	3	2	..	..	..	..
Radical cure of hydrocele,	7	..	4	1	..	..	..	2
Urethrotomy, external,	10	..	6	3	1	..	..	..
Urethrotomy, internal,	2	..	1	..	1	..	..	..
Varicocelectomy,	8	..	6	2	..	..	..	..
Total,	58	..	39	11	5	..	..	3

OPERATIONS ON RECTUM AND ANUS.

	Male.	Female.	Ether.	Nitrous oxide and ether.	Nitrous oxide	Cocaine.	Chloroform.	No anæsthetic.
Excision of fistula in ano,	16	8	14	3	7	..	..	..
Hemorrhoidectomy,	39	6	30	10	4	1	..	..
Incision of ischio-rectal abscess,	7	1	5	1	2	..	..	..
Proctoscopy,	3	1	2	..	1	..	..	1
Sacral colostomy,	1	..	1	..	..	..	..	..
Total,	66	16	52	14	14	1	..	1

OPERATIONS ON UPPER EXTREMITY.

	Male.	Female.	Ether.	Nitrous oxide and ether.	Nitrous oxide.	Cocaine.	Chloroform.	No anæsthetic.
Amputation of arm,	2	..	1	1	..	..	..	..
Amputation of fingers,	11	1	8	1	3	..	..	..
Correction ankylosed joint,	1	..	1	..	..	..	..	..
Incision infected hand,	12	2	9	1	4	..	..	..
Lengthening tendon,	1	..	..	1	..	..	..	..
Reduction dislocated shoulder,	2	..	1	..	..	..	..	1
Reduction fractured humerus,	1	..	1	..	..	..	..	..
Suturing hand,	1	..	..	..	1	..	..	..
Suturing tendons forearm,	2	..	2	..	..	..	..	..
Total,	33	3	23	4	8	..	..	1

OPERATIONS ON LOWER EXTREMITY.

	Male.	Female.	Ether.	Nitrous oxide and ether.	Nitrous oxide.	Cocaine.	Chloroform.	No anæsthetic.
Amputation of leg,	6	2	4	4	..	..	..	..
Amputation of toes,	4	..	3	..	1	..	..	..
Currettage of femur,	1	..	1	..	..	..	..	..
Currettage of tibia,	8	1	4	2	2	..	1	..
Excision of astragalus,	1	..	1	..	..	..	..	..
Excision of bunion,	2	1	2	1	..	..	..	..
Excision of ingrowing toe nail,	1	3	2	..	2	..	..	..
Excision of prepatellar bursa,	2	..	1	..	..	..	1	..
Excision sarcoma of thigh,	2	..	1	1	..	..	..	..
Excision tumor of thigh,	..	1	1	..	..	..	..	..
Excision ulcer of leg,	1	..	1	..	..	..	..	..
Excision varicose veins,	2	..	2	..	..	..	..	..
Incision abscess of thigh,	..	1	1	..	..	..	..	..
Incision infected foot,	2	..	2	..	..	..	..	..
Incision infected leg,	1	..	..	1	..	..	..	..
Osteotomy for bow legs,	1	..	..	..	..	..	1	..
Operation for pes planus,	1	..	..	1	..	..	..	..
Reduction of fractures,	4	..	4	..	..	..	..	..
Removal of exostoses,	3	1	3	1	..	..	..	..
Resection of knee joint,	..	1	1	..	..	..	..	..
Suture of patella,	2	..	2	..	..	..	..	..
Suture wounds of foot,	1	..	..	..	1	..	..	..
Tenotomy,	2	4	6	..	..	..	..	..
Total,	47	15	42	11	6	..	3	..

OPERATIONS UNCLASSIFIED.

	Male.	Female.	Ether.	Nitrous oxide and ether.	Nitrous oxide.	Cocaine.	Chloroform.	No anæsthetic.
Currettage of sinus,	1	..	..	..	..	1	..	..
Drainage of abscess,	8	9	5	3	5	2	..	2
Excision of foreign body,	3	3	5	..	..	..	1	..
Excision of tumor,	4	..	1	..	1	2	..	..
Incision for diagnosis,	2	..	..	1	..	..	..	1
Osteotomy,	2	1	3	..	..	..	..	..
Skin grafting,	10	2	4	4	4	..	..	..
Tetanus antitoxin injection,	3	..	..	..	..	..	3	..
Transfusion,	..	2	..	..	..	2	..	..
Total,	33	17	18	8	10	7	4	3

SUMMARY OF OPERATIONS.

	Male.	Female.	Ether.	Nitrous oxide and ether.	Nitrous oxide.	Cocaine.	Chloroform.	No anæsthetic.
Operations on head, ...	213	192	353	26	1	21	1	3
Operations on neck, ...	14	13	11	12	..	1	..	3
Operations on thorax, ...	8	18	15	3	5	2	1	..
Operations on abdomen, ...	182	182	241	98	9	11	3	2
Operations, gynecological, ...	..	397	374	16	1	..	5	1
Operations on genito-urinary tract, . .	58	..	39	11	5	..	..	3
Operations on rectum and anus, . . .	66	16	52	14	14	1	..	1
Operations on upper extremity, . . .	33	3	23	4	8	..	..	1
Operations on lower extremity, . . .	47	15	42	11	6	..	3	..
Operations unclassified, ...	33	17	18	8	10	7	4	3
Total, ...	654	853	1168	203	59	43	17	17

CARL H. BRYANT,
House Surgeon.

DEATHS

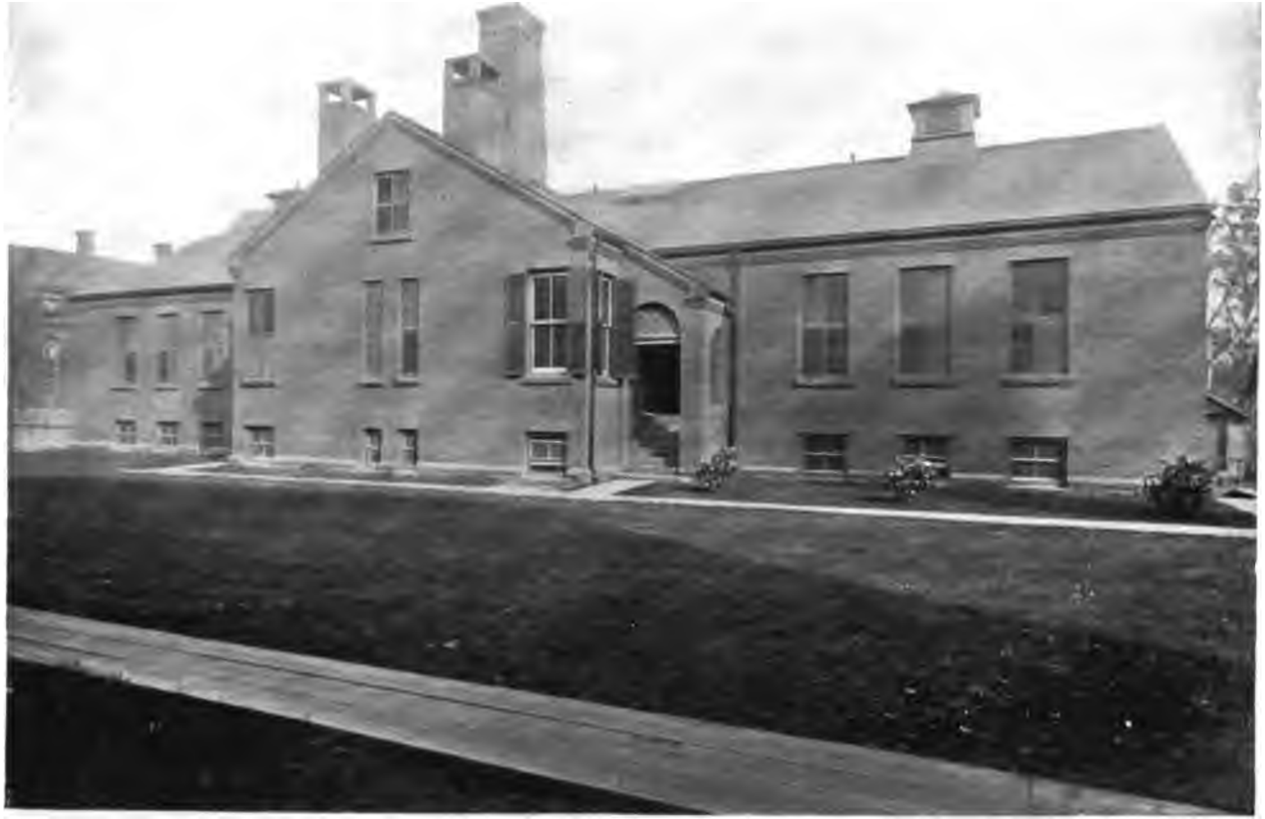
ON MEDICAL SERVICE.

Diseases.	Moribund on admission.	Total.
Arterio-sclerosis,	..	3
Arthritis deformans,	..	2
Cardiac dilatation with pulmonary œdema (acute),	3	3
Cerebral hemorrhage,	5	12
Cirrhosis of liver,	..	3
Delirium tremens,	1	1
Diabetes mellitus,	..	2
Diphtheria,	1	5
Endocarditis, acute,	..	1
Endocarditis, chronic,	1	8
Erysipelas,	..	2
Gas poisoning,	1	1
Gastro-enteritis,	..	5
Heat exhaustion,	2	2
Hodgkin's disease,	..	1
Lymphatic leukemia, acute,	..	1
Marasmus,	..	2
Meningitis, cerebro-spinal,	..	5
Meningitis, tuberculous,	..	2
Myocarditis, chronic,	1	3
Nephritis, acute,	1	2
Nephritis, chronic,	1	7
Pernicious anemia,	.	2
Placenta praevia,	..	1
Pneumonia, broncho,	1	7
Pneumonia, lobar,	4	15
Pott's disease, cervical,	..	1
Pulmonary tuberculosis,	4	73
Pyopneumothorax,	..	4
Rheumatic fever, acute,	..	1
Scarlet fever,	1	4
Senile dementia,	..	2
Septicemia,	2	5
Stillbirths,	..	4
Suicide, poisoning,	3	3
Syphilis tertiary,	..	1
Tetanus,	3	6
Typhoid fever,	..	2
Uremia,	1	1
Total,	36	205

DEATHS

ON SURGICAL SERVICE.

DISEASES.	Moribund on admission.	Total.
Amputation of both legs,	1	1
Bullet in brain,	3	3
Carcinoma of intestines,	..	3
Carcinoma of jaw and ear,	..	1
Carcinoma of liver,	..	3
Carcinoma of lung with pulmonary edema,	..	1
Carcinoma of neck,	..	2
Carcinoma of pancreas,	..	1
Carcinoma of rectum,	..	1
Carcinoma of sigmoid,	..	2
Carcinoma of stomach,	..	9
Carcinoma of tongue,	..	2
Carcinoma of uterus,	..	1
Carcinomatosis,	..	2
Cerebral hemorrhage during labor,	.	1
Cholelithiasis and aneurism of descending aorta,	..	1
Cholelithiasis and cholecystitis,	..	1
Compound fracture of leg with shock,	..	1
Empyema,	..	1
Extensive burns,	3	3
Fractured skull,	7	7
Hydatidiform mole with hemorrhage,	..	1
Hypertrophied prostate and cystitis,	..	1
Multiple injuries with shock,	..	1
Papillary cystoma,	..	2
Peritonitis,	2	11
Peritonitis with empyema,	..	1
Pyelitis and pneumothorax,	.	1
Pyonephrosis,	..	2
Ruptured ectopic gestation,	..	1
Sarcoma of jaw,	..	1
Strangulated hernia,	..	1
Total,	16	70



HARTFORD HOSPITAL - Pavilion for Contagious Diseases.

RULES

FOR THE

ADMISSION OF PATIENTS TO THE HARTFORD HOSPITAL.

1. Patients are admitted between the hours of 8 A. M. and 5 P. M., preferably; emergency cases and confinements at any hour of day or night.

2. Patients are received by permit from towns, from any member of the Executive Committee, or where they can afford to pay the regular price of attendance, by personal application at the office.

3. The permits of all patients are subject to the approval of the Executive Committee.

4. The regular charge per week is $7.00; this includes medical and surgical care, and operation, together with medicines and nursing. The price for private rooms is from $15 to $25 per week.

5. Persons who are destitute of friends or means are provided for in various ways.

6. No person having contagious disease, residing out of the town of Hartford, shall be admitted to the Hospital.

Signed by the Executive Committee.

PRIVATE ROOMS.

1. The Attending Physicians and Surgeons shall receive no fee or pecuniary compensation from any patient who comes under their care in the wards of the Hospital.

2. Physicians and Surgeons may apply to the Hospital for the admission of patients to be treated by them in the private rooms of the Hospital. Their applications will be referred to and acted upon by the Executive Committee. Such patients,

if admitted, will be expected to pay such fees to their attending Physician or Surgeon as shall have been agreed upon between them prior to their admission, provided such patients have first paid all regular charges of the Hospital.

3. Patients applying directly to the Hospital for the use of a private room shall be referred by the Superintendent to the Attending Physician or Surgeon to arrange in regard to his fees, before being admitted to the Hospital; it being understood, however, that the Hospital authorities may, at their discretion, admit a patient to a private room without the payment of any fee, when, in their opinion, after a careful examination into the pecuniary means of such patient, they shall be satisfied that said patient is unable to pay any fee.

COPY OF BOND.

HARTFORD, CONN.,

Upon the admission of   of   into the HARTFORD HOSPITAL, at Hartford, I engage to provide or pay for a sufficiency of clothing for   use, and pay the Treasurer of said institution   dollars per week for board, medicine, and medical attendance; cause said patient to be removed when discharged, and, in the event of death, to pay the expenses of burial.

Principal.

For value received, I hereby engage to become responsible for the fulfillment of the above stipulations.

Surety.

RULES FOR THE ADMISSION OF VISITORS.

1. Visitors are welcome to the Hospital every day, between the hours of 2 and 4 P. M., and from 6:30 to 7 P. M., on every day except Sundays.

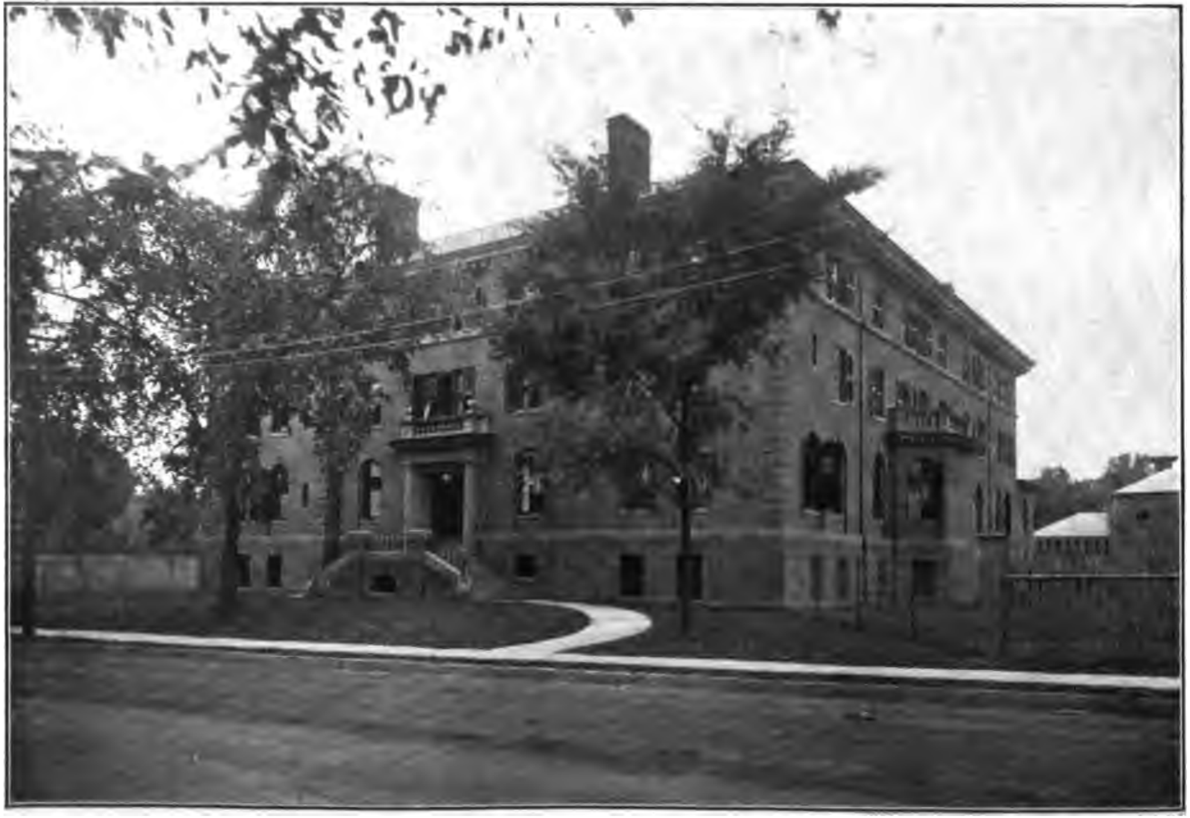
2. Visitors shall not enter the wards without the consent of the Superintendent.

3. Visitors must deposit with the Head Nurse of the

ward or the Superintendent any articles of food or delicacies intended for patients, which articles will be distributed as requested, if not inconsistent with the condition of said patient. No alcoholic drinks or any stimulating drinks or drugs of any kind shall be brought into the Hospital by any friends of patients.

4. No drunkenness or unseemly conduct, profane or vulgar language, and no unnecessary noise or disturbance will be allowed in or about the buildings.

5. All complaints of any sort whatsoever on the part of patients or visitors should be reported to the office, when they will be promptly and thoroughly investigated.



HARTFORD HOSPITAL — Nurses' Building,

TRAINING SCHOOL FOR NURSES

HARTFORD HOSPITAL
TRAINING SCHOOL FOR NURSES.

COMMITTEE AND OFFICERS.

Committee.

PHINEAS H. INGALLS, M.D., 49 Pearl St.,
WILLIAM D. MORGAN, M.D., 49 Pearl St.
GEORGE C. F. WILLIAMS, 990 Prospect Ave.

Superintendent of Hospital.

APPLETON W. SMITH, M.D.

Principal of Training School.

MISS LAUDER SUTHERLAND.

Assistant to the Principal.

MISS LIZZIE L. GOEPPINGER.

Night Supervisor.

MISS EVA J. EDWARDS.

Matron at Wildwood Sanatorium.

MISS AGNES C. KERNAN.

Head Nurses.

MISS IDA F. BUTLER,
MISS MARY E. STEWART,
MISS MARY C. TIERNEY,
MISS CHARLOTTE M. PAGE,
MISS HAZEL B. TWISS,
MISS LUCY A. QUINLAN,
MISS DELIA L. WIENCKE,
MISS MARY E. CODY.

Teacher of Massage.

MRS. EDLA JONSON.

Dietitian.

MISS MILDRED L. HALL.

THE THIRTY-SECOND ANNUAL REPORT

OF THE

Executive Committee of the Hartford Hospital Training School for Nurses.

To the Directors of the Hartford Hospital:

GENTLEMEN: The Executive Committee herewith presents its Thirty-second Annual Report of the Hartford Hospital Training School for Nurses. As to our recommendation for it we call special attention to the general report of the Executive Committee and to the increase of accommodations needed for the Nurses of the Training School. For details of administration we call your attention to the Superintendent's report.

Respectfully,

WILLIAM D. MORGAN, M.D.,
LOUIS R. CHENEY,
PHINEAS H. INGALLS, M.D.,
GILBERT F. HEUBLEIN,
GEORGE C. F. WILLIAMS,
FRANCIS R. COOLEY.

REPORT OF THE SUPERINTENDENT OF NURSES AND PRINCIPAL OF THE TRAINING SCHOOL.

To the Executive Committee of the Hartford Hospital:

GENTLEMEN: I have the honor herewith to present to you the Thirty-second Annual Report of the Training School for Nurses for the year ending September 30, 1909.

The year ends with the following staff on duty in the Hospital, Nurses' Residence and Wildwood Sanatorium:

Superintendent of Nurses and Principal of the Training School,	1	
Assistant to the Principal,	1	
Matron of Wildwood Sanatorium,	1	
Night Supervisor,	1	
Head Nurses,	8	
Supervisor of Probationers and Residence,	1	
Dietitian,	1 —	14
PUPIL NURSES.		
Members of Graduating Class still in School,	6	
Senior Class,	22	
Intermediate Class,	22	
Junior Class and Probationers,	28 —	78
ASSISTANTS ON TUBERCULOSIS WARDS.		
Graduate Nurses,	4	
Attendants,	1 —	5
Total,		97

Some additions to the Staff of Head Nurses and a few changes and rearrangements have been necessary.

Miss Goeppinger remains as assistant to the Principal; Miss Butler in charge of the Gynæcological and Obstetrical Wards; Miss Stewart as Head Nurse of the Private Patients' Corridor and Operating Rooms; Miss Tierney as Head Nurse of the Wards for advanced cases of Tuberculosis; Miss Kernan as Matron of Wildwood Sanatorium; Miss Page as Head Nurse of Ward 2 and General Operating Room, and Miss Hall as Dietitian.

In February, '09, Miss Hazel B. Twiss, H. H. T. S. '08, was appointed Head Nurse of Ward 5 and The Erwin Clinic Rooms, and later she assumed charge of Ward 3 and Private Patients' Corridor.

In March, '09, Miss Lucy A. Quinlan, H. H. T. S. '08, after completing a course of instruction at the Rotch Memorial Hospital, Boston, was appointed Head Nurse of the Children's Ward, succeeding Miss Maud D. Minds, H. H. T. S. '08, who had had temporary charge.

In May, '09, Miss Helen B. Emerson, H. H. T. S. '07, who had been Night Supervisor for a year and a half, resigned. She was made Assistant to the Principal *pro tem.* and during September was Acting Matron at Wildwood Sanatorium.

In May, '09, Miss Eva J. Edwards, H. H. T. S. '99, who had been a Head Nurse for two and a half years, was made Night Supervisor.

In June, '09, Miss Mary Van Zile, Montreal General Hospital, Supervisor of the Residence and Probationers, resigned to take up District Work in Rhode Island.

In June, '09, Miss Isabelle MacCrimmon, H. H. T. S., '00, was appointed to the position of Supervisor, and in September, '09, was succeeded by Miss Mary E. Cody, H. H. T. S. '05.

In July, '09, Miss Delia L. Wiencke, H. H. T. S. '09, was made Assistant to the Head Nurse on the Gynæcological and Obstetrical Wards and in September, '09, was appointed Head Nurse of Ward 5 and the Erwin Clinic Rooms.

A great many requests have been received from other hospitals for our graduates to fill executive positions and an increasing tendency has been shown by the nurses to take advantage of the enlarged fields of usefulness open to the graduate nurse.

The following nurses have received appointments:

Miss Edith L. Leonard, '08, Night Supervisor, Salem Hospital, Salem, Mass.

Miss Olive A. Eddy, '08, Assistant to Superintendent, University Hospital, Charlotteville, Va.

Miss Alice L. Cumming, '09, in charge of Infirmary, Havergal College, Toronto, Ontario.

Miss Julia Johnson, '08, Visiting Nurse, New Britain, Conn.

Miss Minnie E. Hollis, '07, Visiting Nurse, Hartford, Conn.

Miss Kate E. Golding, '07, Visiting Nurse, Paterson, N. J.

Miss Edith F. Guildford, '09, School Nurse, South Manchester, Conn.

On September 30, 1908, there were 71 pupils in training. Twenty-two of these completed their three years' course and left the school.

Of 16 probationers who had not completed their probationary course, 13 were accepted; 3 were rejected.

Forty-four probationers have entered the school during the year; 20 have been accepted as pupil nurses; 9 were not accepted; 3 left for various reasons after being accepted, and the remaining 11 are still on probation.

Three nurses have had to give up the training on account of ill health; one left to be married, and two were dismissed for incompetency.

As the work of the Hospital increases, the necessity for a greater number of nurses becomes more and more urgent. It was thought a year ago that the limit of capacity of the Nurses' Residence had been reached, but it has had to be stretched daily to accommodate the ever arriving special nurses and probationers. That the residence will shortly be enlarged is welcome news for all concerned. The pupil nurses' sitting room has recently been refurnished and repainted, adding very much to its beauty and comfort.

In December, '08, a fair was held for the purpose of raising money for the Library Fund. The sum of $430 was realized by the efforts of the members of the school. Our thanks are due to the members of the Visiting Staff who so ably assisted in making the Fair a success, and the friends of the school who sent contributions are gratefully remembered.

Fifty books have been added to the Library during the year, making a total of two hundred and fifty volumes in the Reference Library.

The course of instruction, by means of practical work, lectures, demonstrations and classes, is being systematically carried out.

Dr. Steiner has again manifested his interest in the school by generously undertaking additional lectures to the Senior Class.

Dr. Allen H. Williams has added to his lectures and demonstrations on Orthopedic Appliances and has made the course of instruction an extremely practical one.

Dr. Paul P. Swett succeeds Dr. Lampson as teacher of bandaging.

Dr. J. C. Rowley, as Dr. Steiner's assistant, will give the lectures and quizzes on Bacteriology.

Lessons on the preparation of food for infants are given by Miss Quinlan, Head Nurse of the Children's Ward.

The probationary period has been extended from 2 to 3 months.

It is a great pleasure to record that Dr. O. C. Smith offers an annual prize of $50 in gold to the pupil in the Senior Class who attains the highest standing in both practical and theoretical work.

The Training School has been established 32 years and to Dr. Smith belongs the honor of establishing the first annual prize.

We extend our most grateful thanks to the Visiting Staff for their instructive lectures and for their medical attendance upon the members of the school.

The Commencement Exercises were held in the South Park M. E. Church on the 29th of October at 8 o'clock in the evening. Dr. W. D. Morgan presided. The Rev. Samuel Hart opened the exercises with prayer.

Dr. Henry M. Hurd, Superintendent of the Johns Hopkins Hospital, addressed the Graduating Class, and Dr. P. H. Ingalls, after a short address, presented the diplomas and pins. The Rev. Elmer Dent closed the exercises with prayer.

A reception followed at the Nurses' Residence.

Every member of the Graduating Class and each Head Nurse received a beautiful corsage bouquet of roses from Dr. O. C. Smith.

The members of the Graduating Class are:

Elizabeth May McKechnie, New Brunswick.
Ethel Blanche Tufts, New Brunswick.
Edith Florence Guildford, Connecticut.
Alice Louise Cumming, Ontario.
Delia Louise Wiencke, New York.
Laura Hyman, Ontario.
Myrtle Alice Dickerman, Connecticut.
Eva Styring, Connecticut.
Rosamond Ellaine Doane, New Jersey.
Addie Mae Lang, Maine.
Maude Amanda Miles, New Brunswick.
Lena Gertrude Ferris, New Brunswick.
Ellen Ethel Drisko, Maine.
Mary Tanner Shannon, Connecticut.
Eva May Lloyd, Ontario.

Respectfully submitted,
LAUDER SUTHERLAND,
Superintendent of Nurses and
Principal of the Training School.

TRAINING SCHOOL FOR NURSES.

INSTRUCTORS.

Superintendent of Nurses and Principal of Training School,
LAUDER SUTHERLAND.

Assistant to the Principal,
LIZZIE L. GOEPPINGER,
Lakeside Hospital Training School for Nurses, Cleveland, O., '05.

Matron at Wildwood Sanatorium,
AGNES C. KERNAN,
Johns Hopkins Training School for Nurses, '01.

Night Supervisor,
EVA J. EDWARDS,
Hartford Hospital Training School for Nurses, '99,
Post Graduate, Presbyterian Hospital, Chicago, Ill.

HEAD NURSES.

Gynæcological Operating Room and Ward, Obstetrical Department,
IDA F. BUTLER,
Hartford Hospital Training School for Nurses, '01.

Private Patients' Corridor and Operating Room,
MARY E. STEWART,
Farrand Training School, Harper Hospital, Detroit, Mich., '06.

Tuberculosis Wards,
MARY C. TIERNEY,
Phipps Institute for the Study of Tuberculosis, Philadelphia, '06.

General Operating Room and Men's Surgical Ward,
CHARLOTTE M. PAGE,
Hartford Hospital Training School for Nurses, '07.

Private Patients' Corridor and Men's Medical Ward,
HAZEL B. TWISS,
Hartford Hospital Training School for Nurses, '08.

Children's Wards,

LUCY A. QUINLAN,
Hartford Hospital Training School for Nurses, '08,
Rotch Memorial Hospital, Boston, Mass.

Men's Medical Ward and Surgical Wards and Erwin Clinic Rooms,

DELIA L. WIENCKE,
Hartford Hospital Training School for Nurses, '09.

Supervisor of Probationers,

MARY E. CODY,
Hartford Hospital Training School of Nurses, '05.

Dietitian,

MILDRED L. HALL,
Graduate, Department of Household Arts, State Normal School, Framingham, Mass., '06.

Instructor in Massage,

MRS. EDLA JONSON,
Graduate, The Hugo Oldenborg Institute, Chicago, Ill.

GENERAL PLAN OF INSTRUCTION.

The Three Years' Course is divided into:

A Probationary Term of Three Months.
A Junior Term of Nine Months.
An Intermediate Term of Twelve Months.
A Senior Term of Twelve Months.

The plan of instructions as outlined in the Syllabus for Nurse Training Schools, of the New York State Education Department, is followed. Each class attends, on an average, two recitations and one lecture each week, from October until June.

Preliminary Instruction is given in:

Domestic Science.
Theory and Ethics of Nursing.
Practical Demonstrations.
Printing and Charting.
Bacteriology.
Anatomy.

JUNIOR TERM.

Demonstrations, Classes, and Practical Work in Medical and Surgical Nursing.

Lectures and Classes in Bacteriology, Anatomy, and Materia Medica.

INTERMEDIATE TERM.

Classes and Demonstration in Practical Nursing.

Practical Work in Medical, Surgical, Children's, and Contagious Wards.

Lectures on General Medicine, Surgery, Orthopedics.

Care of Children, Urinary Analysis, Bandaging.

SENIOR TERM.

Class Instruction in Massage, Obstetrics.

Dietetics, Preparation for Private Duty, Nursing Ethics.

Nursing of Special Senses.

Executive Work.

Lectures and Demonstrations in Medical and Surgical Emergencies, Obstetrics, Gynæcology, and Diseases of the Eye, Ear, Throat, Nose, and Skin.

Practical work includes a term of at least six weeks in each of the following:

The General Operating Room.
The Gynæcological Ward and Operating Room.
The Obstetrical Ward.
Private Wards and Operating Room.
The Diet Kitchen.
Executive Work.

LECTURES

1909–1910.

DR. O. C. SMITH.

Address to the School.

October 1, 8 P. M. Nursing Ethics.

JUNIOR LECTURES.

WEDNESDAY, 4 TO 5 P. M.

DATE.	LECTURER.	SUBJECT.
Nov. 3, 1909	Drs. Walter R. Steiner	Bacteriology.
" 10, "	and J. Carter Rowley,	"
" 17, "	" " "	"
" 24, "	" " "	"
Dec. 1, "	" " "	"
" 8, "	" " "	"
" 15, "	" " "	"
" 22, "	Dr. Ernest A. Wells,	Anatomy and Physiology.
" 29, "	" " "	" " "
Jan. 5, 1910	" " "	" " "
" 12, "	" " "	" " "
" 19, "	" " "	" " "
" 26, "	" " "	" " "
Feb. 2, "	" " "	" " "
" 9, "	" " "	" " "
" 16, "	" " "	" " "
" 23, "	" " "	" " "
Mar. 2, "	" " "	" " "
" 9, "	" " "	" " "
" 16, "	" " "	" " "
" 23, "	" " "	" " "
" 30, "	" " "	" " "
Apr. 6, "	" " "	" " "
" 13, "	" " "	" " "
" 20, "	" " "	" " "

INTERMEDIATE CLASS.

TUESDAYS, 4 TO 5 P. M.

CLASS IN THREE SECTIONS. SIX LESSONS TO EACH SECTION.

DATE.			LECTURER.			SUBJECT.
Dec.	7,	1909	Dr. Paul Swett.			Bandaging.
"	14,	"	"	"	"	"
"	21,	"	"	"	"	"
"	28,	"	"	"	"	"
Jan.	4,	1910.	"	"	"	"
"	11,	"	"	"	"	"
"	18,	"	"	"	"	"
"	25,	"	"	"	"	"
Feb.	1,	"	"	"	"	"
"	8,	"	"	"	"	"
"	15,	"	"	"	"	"
"	22,	"	"	"	"	"
Mar.	1,	"	"	"	"	"
"	8,	"	"	"	"	"
"	15,	"	"	"	"	"
"	22,	"	"	"	"	"
"	29,	"	"	"	"	"
Apr.	5,	"	"	"	"	"

DR. ALLEN H. WILLIAMS.

October and November. Application of Splints, Bandages and Supports.

Three lectures to the whole class.

Class in three sections. Two lessons to each section.

Special Lectures.

DR. MARIAN W. WILLIAMS

VENEREAL DISEASES.

INTERMEDIATE LECTURES.

THURSDAYS, 4 TO 5 P.M.

DATE.			LECTURER.	SUBJECT.
Oct.	7,	1909	Dr. G. N. Bell,	Antiseptics and Methods of Sterilization.
"	14,	"	" " "	The Principles of Aseptic and Antiseptic Surgery.
"	21,	"	Dr. A. M. Rowley,	Surgical Diseases.
"	28,	"	" " "	Surgical Diseases.
Nov.	4,	"	" " "	Anæsthetics.
"	11,	"	Dr. C. A. Goodrich,	Condition and Care of Newly Born Child.
"	18,	"	" " "	Infant's Food. Milk. Modified Preparations.
Dec.	2,	"	" " "	Contagious Diseases.
"	9,	"	" " "	Contagious Diseases.
"	16,	"	" " "	Contagious Diseases.
"	23,	"	Dr. J. C. Rowley,	Intubation in Diphtheria.
"	30,	"	Dr. Wm. Porter, Jr.,	Care in Intestinal Disorders and other Acute Illnesses.
Jan.	6,	1910.	Dr. W. R. Steiner,	Evidences of Disease.
"	13,	"	" " "	Some Clinical Tests of Value in Diagnosis.
"	20,	"	" " "	Infectious Diseases — Typhoid Fever.
"	27,	"	" " "	Other Infectious Diseases.
Feb.	3,	"	" " "	Diabetes Mellitus—Diabetes Insipidus—Gout.
"	10,	"	" " "	Diseases of Respiratory System.
"	17,	"	" " "	Diseases of Circulatory System.
"	24,	"	" " "	Diseases of Hematopoietic System.
Mar.	3,	"	" " "	Diseases of Digestive System.
"	10,	"	" " "	Diseases of Kidneys.
"	17,	"	" " "	Rheumatic Affections.
"	24,	"	" " "	Malignant Growths.
"	31,	"	Dr. E. K. Root,	Diet in Health and Disease.
Apr.	7,	"	" " "	Diet in Health and Disease.
"	14,	"	Dr. Wm. B. Bartlett,	Tuberculosis.
"	21,	"	" " "	Tuberculosis.

SENIOR LECTURES.

MONDAYS, 4 TO 5 P.M.

DATE.	LECTURER.	SUBJECT.
Oct. 4, 1909.	Dr. O. C. Smith,	Medical Emergencies.
" 11, "	" " "	Surgical Emergencies.
" 18, "	" " "	First Aid to the Injured.
" 25, "	Dr. T. W. Chester,	Obstetrics.
Nov. 1, "	" " "	Obstetrics.
" 8, "	" " "	Obstetrics.
" 15, "	" " "	Obstetrics.
" 22, "	" " "	Obstetrics.
" 29, "	Dr. P. H. Ingalls,	Principal Gynecological Operations and Preparations.
Dec. 6, "	" " "	Laparotomy Preparation and Nursing.
" 13, "	Dr. F. L. Waite,	Diseases of the Ear.
" 20, "	Dr. S. B. St. John,	Anatomy and Care of the Eye in Health.
" 27, "	" " "	Diseases of the Eye.
Jan. 3, 1910.	Dr. E. K. McKnight,	Surgery and Operating Room Technique.
" 10, "	" " "	Surgery and Operating Room Technique.
" 17, "	Dr. F. S. Crossfield,	Diseases of the Nose and Throat.
" 24, "	" " "	Diseases of the Nose and Throat.
" 31, "	" " "	Diseases of the Nose and Throat.
Feb. 7, "	" " "	Diseases of the Nose and Throat.
" 14, "	Dr. W. R. Steiner,	Nervous Diseases.
" 21, "	" " "	Nervous Diseases.
" 28, "	Dr. M. S. Bradley,	Diseases of the Skin.
Mar. 7, "	" " "	Diseases of the Skin.
" 14, "	Dr. R. L. Rowley,	Materia Medica.
" 21, "	" " "	Materia Medica.
" 28, "	" " "	Materia Medica.
April 4, "	" " "	Materia Medica.
" 11, "	" " "	Materia Medica.
" 18, "	" " "	Materia Medica.
" 25, "	" " "	Materia Medica.
May 2, "	" " "	Materia Medica.

LIST OF MEMBERS

OF THE

TRAINING SCHOOL

September 30, 1909.

MEMBERS OF THE GRADUATING CLASS STILL IN SCHOOL.

Ethel Blanche Tufts,
Addie Mae Lang,
Lena Gertrude Ferris,
Ellen Ethel Drisko,
Eva May Lloyd.

SENIOR CLASS.

Henrietta Grace Segur,
Lizzie Pauline Uzelmeier,
Florence Leslie Cameron,
Alice Cecelia Blake,
Anna Milvina Kirkland,
Mary Elizabeth Peck,
Nellie Gates Brown,
Louise Josephine Fouet,
Grace Mary Cook,
Geneva Hillard Trumbull,
May Blanche Catchpole,
Bertha Newell Cooke,
Esther Jennings Cady,
Annie Rebecca Hillcoat,
Eva May Hartz,
Frances Clarke Davidson,
Katherine Mary LaDam,
Helen Laura Horton,
Ruth Abbott,
Louise Ada Day,
Jennie Daisy Needham,
May Augusta Sabin,
Eleanor Roberts,
Marie Leonie Desjardines.

INTERMEDIATE CLASS.

Abigail Elizabeth Cushman,
Hattie Gamm,
Edith Tate Bartlett,
Eleanor Margaret Carter,
Elizabeth Weiss Rockstroh,
Jennie Evelyn Rogers,
Edna Lucile Hosmer,
Anna Louise Penell,
Edna Augusta Munger,
Harriet Ellis Oswald,
Emily Louise Alquest,
Gertrude Althea Cook,
Pearl Evelyn Newcombe,
Grace Elizabeth Mair,
Rosetta Josephine Watters,
Maude Baillie Phipard,
Emma Maude Fulton,
Lucy Pratt Mitchell,
Gertrude Belle Wright,
Edith May Hawley,
Mazie Gerow Trites,
Cornelia Mary Eddy.

JUNIORS AND PROBATIONERS.

Minnie Isabel Butterworth,
Daisy Campbell Best,
Alice Turnbull White,
Georgia Whiteside McCrossin,
Gertrude Elizabeth Mangum,
Marion Rita Carton,
Elizabeth Stanley,
Josephine Edwina Waycott,
Elizabeth May Focht,
Rose Mary Law,
Selma Catherine Smith,
Isabel Comstock McKee,
Ellice May Simpson,
Alice Sophie Wilson,
Helen Munroe Thayer,
Frances Margaret Dickson,
Ruth Cordelia Webb,
Mabelle Madeline Manning,
Esther May Jarrett,
Clara Wright Bridgman,
Effie Delia Stearns,
Agnes Grant,
Edna May Biggerstaff,
Ruth Whitney Thoms,
Ellen Wilhelmina Malmfeldt,
Genevieve Roberts,
Constance Clark Smith.

LIST OF GRADUATES.

LIST OF GRADUATES

HARTFORD HOSPITAL TRAINING SCHOOL FOR NURSES

Class of 1879.

Name.	Occupation.	Residence.
Mrs. Caroline A. House,	Masseuse,	Inmate O. P. H., Hartford, Conn.
Miss Hannah M. Callahan,		
Miss Amelia Cooke,	Deceased,	
Mrs. Annie Morrell,	Deceased,	
Miss Lydia S. Woodward,	Private nurse,	21 Avery St., Springfield, Mass.

Class of 1880.

Miss Lizzie T. Oliver,	Married,	
Miss Mary E. Crane,		
Miss Ida F. Barnes,	Physician,	Beverly, Mass.

Class of 1881.

Miss Kate E. Kinne,		Hartford, Conn.
Miss Alice M. Noble,	Married,	
Miss Alice M. Delano,	"	
Miss Georgette T. Rogers,	Mrs. C. M. Spencer, deceased,	
Miss Annie C. Abbe,		
Miss Marion E. Kingsley,	Asst. Matron,	Y. W. C. A., Hartford, Conn.
Miss Annie M. Wakefield,	Private nurse,	

Class of 1882.

Name.	Occupation.	Residence.
Miss Mattie Kingsley,	Married,	
Miss Mary I. Denison,	Mrs. Henry W. Fuller,	33 So. Hudson St., Hartford, Conn.
Miss Elizabeth L. Goodale,	Married,	
Miss Lydia B. Roberts,	Private nurse,	41 Spring St., Springfield, Mass.
Miss Jennie McLaughlin,		

Class of 1883.

Miss Alice Ewen,	Married,	
Miss Harriet M. Hosking,	"	
Miss Lucy A. Kirk,	Physician,	Dorchester, Mass.
Mrs. Zoe M. Tucker,	Deceased,	
Miss Sarah M. Sheldon,	Private nurse,	181 Maple Ave., Hartford, Conn.
Miss Eliza C. Smith,	Mrs. Lane,	131 Ashley St., " "
Mrs. Charlotte F. Schults,	Private nurse,	2 Gilman St., " "
Miss Hannah L. Russell,	" "	Highland Park, Conn.

Class of 1884.

Miss Emma Strickland,	Mrs. Muzzy, deceased,	
Miss Harriet E. Fuller,	Private nurse Mrs. Miller,	41 Niles St., Hartford, Conn.
Miss Maria A. Clark,	Mrs. Tracy,	Inmate O. P. H., " "
Miss Josie L. Hubbard,	Mrs. Hatch, deceased,	
Miss Emma J. Osborn,	Private nurse,	7 Sibley Ave., Westfield, Mass.
Miss Jennie M. Beardsley,		837 Orange St., New Haven, Conn.
Miss Alice M. Gardiner,		

Class of 1885.

Name.	Occupation.	Residence.
Miss Lucy Way,	Private nurse,	30 Gillette St., Hartford, Conn.
Miss Annie L. McLese,	Mrs. Pugsley,	Massachusetts.
Miss Emilie M. Pugsley,	Married,	
Miss Mary E. Brown,	Mrs. Eugene Wilbur,	
Miss Lillian Catlin,	Deceased,	

Class of 1886.

Miss Martha B. Parker,		
Miss Hattie E. Crocker,	Private nurse,	33 So. Hudson St., Hartford, Conn.
Miss Ella J. Holcomb,		
Miss Gertrude E. Morley,	Mrs. Joy,	Shelburne Falls, Mass.
Miss Emma L. Terrell,	Private nurse,	Westfield, Mass.
Miss Minnie Hicks,	Nurse, Soldiers' Home,	Noroton, Conn.
Miss Elma A. Bennett,	Deceased,	
Miss Rebecca LaMonte,	Private nurse,	Brooklyn, N. Y.
Miss S. Alice Griswold,		

Class of 1887.

Miss Carrie Swettenham,	Mrs. Davis, deceased,	
Miss Annie C. McNeil,		
Miss Annie Figgis,	Mrs. Huntley	Claremont, N. H.
Miss Emma Carver,	Private nurse,	West Stockbridge, Mass.
Miss Jennie B. Methven,	Married,	
Miss Nellie T. Manning,	Mrs. Woodward,	Springfield, Mass.
Miss Janet MacKeen,	Nurse,	O. P. Home, Hartford, Conn.
Miss Juliette A. Parsons,	Supt. Sanatorium,	Thompson St., Springfield, Mass.

Class of 1888.

Name.	Occupation.	Residence.
Miss Maria A. Wakefield,	Private nurse,	New York City.
Miss Hattie B. Smith,	Mrs. Fowler,	" " "
Miss Jennie McCollister,	Private nurse,	358 Hampden St., Holyoke, Mass.
Miss Jessie T. Jeffrey,	Mrs. Cameron,	Butte, Montana.
Miss Helen McCloy,	Private nurse,	West Hebron, N. Y.
Miss Delia L. Bridgeman,	Mrs. J. H. Gilpin,	Florence, Mass.
Miss Annie Black,	Married,	Boston, Mass.

Class of 1889.

Name.	Occupation.	Residence.
Mrs. Ida D. Lewis,	Private nurse,	Springfield, Mass.
Miss Annie E. North,	Mrs. Wm. Dudley,	E. Hartford, Conn.
Miss Allie Cornelius,	Private nurse,	60 Cone St., Hartford, Conn.
Miss Henrietta E. Willet,	Mrs. Samuel Childs, deceased,	
Mrs. Addie L. Loyd,	Private nurse,	200 Allyn St., Hartford, Conn.
Miss Ella E. Gibbs,	" "	41 Spring St., Springfield, Mass.
Miss Bessie C. Taber,	Mrs. A. O. Peden,	Capitolia, California.
Miss Rilla J. Perry,	Supt. Presbyterian Hospital,	Waterloo, Iowa.

Class of 1890.

Name.	Occupation.	Residence.
Miss Alice M. Smith,	Private nurse,	150 Capitol Ave., Hartford, Conn.
Miss Jennie R. Field,	" "	Dalton, Mass.
Miss Alma A. Robinson,	Married, Private nurse,	Panama.
Miss Nancy R. Cornelius,	Mrs. Skenandore, deceased,	
Miss Delia M. Smith,	Private nurse,	Feeding Hills, Mass.

Class of 1890.—Continued.

Name.	Occupation.	Residence.
Miss Harriet A. Lorber,	Private nurse,	150 Capitol Ave., Hartford, Conn.
Miss Martha J. Wilkinson,	Visiting nurse,	124 Windsor Ave., " "
Miss Isabella M. Snelling,	District nurse,	New York City Mission.
Miss Mary J. Barr,	Mrs. Swift,	Cedar St., New Britain, Conn.

Class of 1891.

Miss Mary M. Brown,	Mrs. John Fancher,	Collinsville, Conn.
Miss Emma J. Lyman,	Deceased,	
Miss Lillie Wind,	Private nurse,	Goodwin Bldg., Hartford, Conn.
Miss Emma B. Richards,	" "	150 Capitol Ave., " "
Miss Etta A. Straw,	Mrs. T. H. Conklin,	Webster St., " "
Mrs. Eva C. Swift,	Deceased,	

Class of 1892.

Miss Annie E. Palmer,	Private nurse,	121 Newington Ave., Hartford, Conn.
Miss Mary A. Rogers,	" "	203 Sigourney St., " "
Miss Minnie I. Bacon,	" "	29 Green St., Springfield, Mass.
Miss Mary L. Marsh,	Mrs. Thos. E. Smith,	Torrington, Conn.
Miss Mary A. Farnsworth,	Visiting nurse,	South Orange, N. J.
Miss Jessie M. Randall,	Private nurse,	Hazardville, Conn.
Miss Mary J. Harrison,	Mrs. Richards, deceased,	
Miss Hattie E. Allen,	Private nurse,	17 Beech St., Springfield, Mass.
Miss Lois S. Peck,	Mrs. Williams,	Trumbull St., Hartford, Conn.
Miss Ella J. French,	Mrs. Farnsworth,	Coaticooke, Que.

Class of 1893.

Name.	Occupation.	Residence.
Miss Lillian M. Alexander,	Mrs. William F. Francis,	Pittsfield, Mass.
Miss Janie McNeil,	Private nurse,	Brooklyn, N. Y.
Miss Lois Pomeroy,	Married,	
Miss Annie E. Brazos,	Private nurse,	29 Buckingham St., Hartford, Conn.
Miss Ellen S. Richardson,	Private nurse,	California.
Miss Minnie A. Havens,	Mrs. Partree,	
Miss Lillian A. Dermont,	Mrs. Erastus Root,	West Hartford, Conn.
Miss Eleanor Campbell,	Married,	
Miss Carmel Cretcher,	Private nurse,	New York City (Teachers' College).
Miss Mildred E. Sherwood,	Supt. Wyckoff Hall Sanatorium,	Asheville, N. C.
Miss Emily A. Dalton,	Private nurse,	69 Tremont St., Hartford, Conn.
Miss Harriet Hendrick,	" "	58 West 48th St., New York City.
Miss Eva Trenholm,	Married,	Philippines.

Class of 1894.

Name.	Occupation.	Residence.
Miss Margaret Cunningham,	Private nurse,	65 Hall St., No. Adams, Mass.
Miss Eliza MacKeen,	Mrs. Philip Casey,	Athol, N. S.
Miss Julia E. Ferguson,	Private nurse,	25 New Park Ave., Hartford, Conn.
Mrs. Lily W. Stevens,	Mrs. Geo. Marvin,	Bloomfield, Conn.
Miss Mary E. Jenison,	Private nurse,	Calumet, Mich.
Miss Sarah L. Harrison,	" "	170 Sigourney St., Hartford, Conn.
Miss Adelaide M. Throop,	" "	West Morris, Conn.
Miss Christine J. Rae,	Deceased,	
Miss Mary A. Rood,	Private nurse,	111 Fairfield Ave., Bridgeport, Conn.
Miss Fannie Nichols,	Deceased,	

Class of 1894.—Continued.

Name.	Occupation.	Residence.
Miss Frances O. Mather,	Private nurse,	Suffield, Conn.
Miss Geneva Dunning,	Deceased,	
Mrs. Inez L. Fowler,	Private nurse,	South Hadley, Mass.
Miss Arrette E. Jenkins,	" "	Bethel, Conn.

Class of 1895.

Name.	Occupation.	Residence.
Miss Josie M. Brown,	Married, deceased,	
Mrs. Minnie P. Cheney,	Married,	Manchester Green, Conn.
Miss Lottie Beck,	Private nurse,	Larrabee St., Burnside, Conn.
Miss Bertha S. Holt,	Married,	Boston, Mass.
Miss Winnefred B. Hardiman,	Private nurse,	210 Farmington Ave., Hartford, Conn.
Miss Annie L. Lynde,	Married,	Chester, Conn.
Miss Hattie I. Waterman,	Private nurse,	150 Capitol Ave., Hartford, Conn.
Miss Daisy Lewis,	Mrs. Osgood Martin,	Goodwin Bldg., " "
Miss Anna A. Keller,	Deceased,	
Miss Florence E. Carman,	Private nurse,	Gibson, New Brunswick.

Class of 1896.

Name.	Occupation.	Residence.
Miss Lillie D. Phillips,	Mrs. Wiencke,	Schenectady, N. Y.
Miss C. E. Shermerhorn,	Married, private nurse,	
Miss Margaret Spitzli,	Private nurse,	31 Belden St., Hartford, Conn.
Miss Katherine D. Arthur,	" "	75 Bell Ave., Cleveland, Ohio.
Miss Ruby E. Gates,	Mrs. Gates,	Hartford, Conn.
Mrs. E. K. Morehouse,	Married,	778 New Britain Ave., Hartford, Conn.
Miss Grace W. Cushman,	Deceased,	

Miss Jessie K. Denison,	Private nurse,	400 Windsor Ave., Hartford, Conn.
Miss Eliza Barker,	Private nurse,	17 Greek St., Lockport, Eng.
Miss Mary F. Jons,		310 No. Second St., Clinton, Iowa.
Miss Jane A. Bryson,	Private nurse,	31 Belden St., Hartford, Conn.
Mrs. Minnie A. Stafford,	" "	Barronsfield, N. S.

Class of 1897.

Miss Marie Miellez,	Nurse,	Dr. Bull's Sanatorium, New York.
Miss Mary C. McGarry,	Private Sanatorium,	30 Charter Oak Ave., Hartford, Conn.
Miss Emma L. Ward,		
Miss Theresa M. Townsend,	Mrs. A. U. Grant,	Cape Breton, N. S.
Miss Caroline Tobey,	Mrs. B. Kaufmann,	Philadelphia, Pa.
Miss Clara H. Hearle,	Married,	Ontario, Canada.
Miss Jessie E. Knapp,	"	
Miss Mary J. Wright,	Private nurse,	90 Buckingham St., Hartford, Conn.
Miss Mary C. Johnson,	" "	29 " " " "
Miss Carlotta Munoz,	Mrs. A. M. Rowley,	53 Main Street, " "
Miss Grace C. Ballou,	Mrs. F. F. Dunne,	New York City.
Miss Margaret M. Bramley,	Mrs. Louis Barker,	New Britain, Conn.
Miss Helen M. Jones,	Private nurse,	22 Sumner St., Hartford, Conn.

Class of 1898.

Miss Margaret D. Hunter,	Mrs. Harry Bunce,	Waterbury, Conn.
Miss Elizabeth M. Abbe,	Private nurse,	Enfield, Conn.
Miss Lena I. Pratt,	Mrs. Mann,	52 Niles St., Hartford, Conn.
Miss Mary H. Nutting,	Private nurse,	149 Sigourney, St., " "
Miss Frances A. Bingham,	" "	199 Vine Street, " "
Miss Annie E. Shepard,	Head nurse, Conn. Hosp. for Insane,	Middletown, Conn.

Class of 1898.—Continued.

Name.	Occupation.	Residence.
Miss Mary E. Snow,	Private nurse,	56 Dean St., Hartford, Conn.
Miss Jane A. Dunn,		
Miss Ida A. Kauffman,	Married,	
Miss Edith Childs,	Private nurse,	29 Buckingham St., Hartford, Conn.
Miss Margaret A. Doyle,	" "	108 Ashley St., " "
Miss Sarah A. Wheeler,	Nurse in charge of Episcopal Hosp.,	Orlando, Florida.
Miss Sarah Ripley,	Private nurse,	29 Buckingham St.,' Hartford, Conn.
Miss Idella M. Pardee,	" "	Southington, Conn.
Miss Lucy A. Bates,	" "	29 Buckingham St., Hartford, Conn.
Miss Katherine E. Boies,	" "	Goodwin Bldg. " "
Miss Maude M. Carter,	Mrs. McKeever,	East Hartford, Conn.

Class of 1899.

Miss Mabel A. McNaughton,	Mrs. L. H. Beamish,	Savonas, B. C.
Miss Isabel F. Pascoe,	Mrs. L. A. Gladding,	64 Winthrop St., New Britain, Conn.
Miss Edith A. Roth,	Mrs. Skyes,	Putnam, Conn.
Miss Sarah E. Blenkhorne,	Mrs. Loomis,	7 So. Highland St., Hartford, Conn.
Miss Katherine M. Jordan,	Private nurse,	Paradise Row, St. John, N. B.
Miss Alice Goodrich,	Mrs. Butler,	217 Farmington Ave., Hartford, Conn.
Miss Martha S. Ball,	Private nurse,	W. 16th St., New York City.
Miss Elizabeth Connor,	Mrs. Ramsey,	New Britain, Conn.
Miss Alice Lee,	Private nurse,	Chicago, Ill.
Miss Mary E. Wolcott,	" "	29 Buckingham St., Hartford, Conn.
Miss Mary B. Smart,	Mrs. Look,	Martha's Vineyard, Mass.
Miss Bertha Davis,	Married,	New York State.
Miss Clara B. Case,	Mrs. Wm. Carrington,	Brooklyn, N. Y.

Miss Isabel F. Shannon,	Private nurse,	37 Raymond St., Hartford, Conn.
Miss Eva J. Edwards,	Night Supervisor,	Hartford Hospital, " "
Miss Joysette Lynn,	Deceased,	

Class of 1900.

Miss Annie L. Garvie,	Private Nurse,	69 Goodwin Bldg., Hartford, Conn.
Miss Isabelle McCrimmon,	" "	45 Farmington Ave., " "
Miss Harriet P. Cunningham,	" "	77 Sigourney St., " "
Miss Janet A. Campbell,	" "	29 Buckingham St., " "
Miss Alice A. Bosanko,	" "	56 Vernon St., " "
Miss Bessie L. Colter,	Head nurse, Lutheran Hospital,	Lacrosse, Wis.
Miss Alice M. Godwin,	Private nurse,	Portsmouth, Ont.
Miss Ella Jenney,	Mrs. D. Mallory,	Capitol Ave., Hartford, Conn.
Miss Nellie Hackett,	Private nurse,	New York.
Miss Amelia F. Armstrong,	Married,	Ontario, Canada.
Miss Ruth A. Morton,	Private nurse,	282 Sigourney St., Hartford, Conn.
Miss Mary J. Daley,	" "	San Francisco, Cal.
Miss Flora A. Martin,	" "	Goodwin Bldg., Hartford, Conn.
Miss Daisy Carlton,	" "	Highland Court, " "
Miss Sara A. Carroll,	" "	109 Bassett St., New Britain, Conn.
Miss Clara Bachand,	" "	Collinsville, Conn.
Miss Edna F. Titus,	Visiting nurse,	Saranac, N. Y.
Miss Grace Widdison,	Mrs. Wm. E. Hubbard,	308 Sigourney St., Hartford, Conn.
Miss Harmony Twichell,	Mrs. Chas. Ives,	New York City.

Class of 1901.

Miss M. Myrtle Sturgess Marvin,	Private nurse,	29 Buckingham St., Hartford, Conn.
Miss Mary Grace Bacon,	" "	29 Green St., Springfield, Mass.
Miss Gertrude Overton Lewis,		312 Farmington Ave., Hartford, Conn.

Class of 1901.—Continued.

Name.	Occupation.	Residence.
Miss Hattie Humphrey,	Asst. matron,	Litchfield Co. Hosp., Winsted, Conn.
Miss Ella Ann Derrick,	Private nurse,	St. Albans, Vermont.
Miss Lucile Mast,	Resident “	Miss Porter's School, Farmington, Ct.
Miss Annie Eliza Ruggles,		Lenox Court, Hartford, Conn.
Miss Eleanor Dana Hunt,	Mrs. D. Wright,	“ “ “ “
Miss Agnes Quinn,	Private nurse,	29 Buckingham St., Hartford, Conn.
Miss Nancy Kellogg Hubbard,	Married,	
Miss Alice Carey Brown,	Mrs. Harry Baxter,	Bellows Falls, Vermont.
Miss Abbie Elizabeth Colby,	Resident nurse,	Boys School, Simsbury, Conn.
Miss Ida Fatio Butler,	Head nurse,	Hartford Hospital, Hartford, Conn.
Miss Katherine McLeod,	Married,	St. Johns, N. B.
Miss Roberts McBride,	“	
Miss Gesila Grohmann,	Private nurse,	29 Buckingham St., Hartford, Conn.

Class of 1902.

Miss Minnie Morse,	Mrs. George A. Briggs,	308 Garden St., Hartford, Conn.
Miss Katherine Rutherford,	Private nurse,	90 Buckingham St., Hartford, Conn.
Miss Louise L. Crandall,	Married,	Troy, N. Y.
Miss Mary G. McLaughlin,	Mrs. Joseph Williams,	Jericho, Vermont.
Miss Amy J. Robinson,	Matron,	Litchfield Co. Hosp., Winsted, Conn.
Miss Constance Leigh,	Private nurse,	87 Capitol Ave., Hartford, Conn.
Miss L. Gertrude Boutelle,	Mrs. Earle B. Conant,	East Hartford, Conn.
Miss Elizabeth Jones,	Private nurse,	“ “ “
Miss Annie I. Oliver,	Mrs. Arthur Thomas,	Jamaica, Vt.
Miss C. Alice Hunter,	Private nurse,	Chicago, Ill.

Miss Rosalie E. Thielcke,	Private nurse,	311 Wash'ton Ave., Brooklyn, N. Y.
Miss Charlotte N. Page,	" "	29 Buckingham St., Hartford, Conn.
Miss Carolin M. Owen,	" "	Albany, N. Y.
Miss Annie T. Bates,	" "	Westfield, Mass.
Miss A. Lou Gillis,	Mrs. Stevens,	Cambridge, Mass.
Miss Margaret R. Gray,	Private nurse,	Vancouver, B. C.
Miss Marietta Norton,	Mrs. Howard Pendleton,	73 Wetmore St., Winsted, Conn.
Miss Evelyn Lingwood,	Private nurse,	20 Prospect St., Hartford, Conn.

Class of 1903.

Miss Bertha L. Graves,	Private nurse,	90 Buckingham St., Hartford, Conn.
Miss Alice M. Brooks,		3 Linden Place, " "
Miss Louise E. Keister,	Supt. of Nurses, Worcester Hospital,	Worcester, Mass.
Miss Anna L. Young,	Mrs. Wm. Chapman,	Portland, Maine,
Miss Florence J. Case,	Mrs. H. W. Bigelow,	24 Deerfield Ave., Hartford, Conn.
Miss Mary E. Coombs,	Mrs. C. K. Green,	148 Smith St., " "
Miss Cora M. Beale,	Private nurse,	71 Burritt St., New Britain, Conn.
Miss Florence L. Wetmore,	Superintendent,	Flushing Hospital, Flushing, N. Y.

Class of 1904.

Miss Eva G. Southworth,	Private nurse,	29 Buckingham St., Hartford, Conn.
Miss Martha J. Elliott,	" "	Roxburn, Que.
Miss Alice L. Simonds,	Mrs Arthur Piper,	Jamaica, Vt.
Miss Agnes T. Donald,	Private nurse,	90 Buckingham St., Hartford, Conn.
Miss Blanche I. Moray,	Deceased,	
Miss Carrie M. Kennedy,	Private nurse,	301 West 109th St., New York City.
Miss Annie M. Duke,	" "	292 Waterloo St., St. John, N. B.
Mrs. Maud E. Tilton,	Mrs. Wm. H. Van Strander,	71 Church St., Hartford, Conn.

Class of 1904.—Continued.

Name.	Occupation.	Residence.
Miss Jennie E. Wheeler,	Private nurse,	90 Buckingham St., Hartford, Conn.
Miss Edna L. Foley,	Visiting nurse,	Chicago, Ill.
Miss Mary A. McCrimmon,	Private nurse,	45 Farmington Ave., Hartford, Conn.
Miss Lucina M. Boughton,	“ “	47 Niles St., “ “
Miss Bertha Rhodes,	“ “	172 Sigourney St., “ “
Miss Elizabeth Corker,	“ “	558 New Britain Ave., “ “
Miss Mennie L. Wallace,	Mrs. Lyons,	473 Franklin Ave., “ “
Miss Maud L. Ashley,	Private nurse,	Napanee, Ont.

Class of 1905.

Miss Alice C. Brown,	Private nurse,	90 Buckingham St., Hartford, Conn.
Miss Martha Morton,	Mrs. Robert Chapman,	Ontario, Canada.
Miss Laura A. Pittner,	Private nurse,	90 Buckingham St., Hartford, Conn.
Mrs. Aloysia P. LeFebre,		
Miss Gertrude M. Fowkes,	Mrs. Loveland,	109 Broad St., Middletown, Conn.
Miss Sarah F. Logan,		Truro, N. S.
Miss Blanche McCallum,	Mrs. G. H. Hagen,	Amherst, N. S.
Miss Alice H. McCormac,	Visiting nurse,	124 Windsor Ave., Hartford, Conn.
Miss Annable Culross,	Private nurse,	90 Buckingham St., “ “
Miss Amelia B. Chidsey,	Mrs. John Bain,	Williamstown, Mass.
Miss Eunice Stegmann,	Private nurse,	90 Buckingham St., Hartford, Conn.
Miss Mary Coutts,	“ “	47 Niles St., “ “
Miss Margaret M. Brennan,	“ “	1405 Main St., “ “
Miss Grace H. Emery,	“ “	90 Buckingham St., “ “
Miss Mary E. Cody,	Superintendent, nurses' residence,	Hartford Hospital, “ “

Miss Grace R. Smith,	Mrs. McGibbon,	Jericho, Vermont.
Miss Edith Culcheth,	Private nurse,	Portsmouth, Ont.
Miss Ida H. Lassman,	" "	28 Waverly Bldg., Hartford, Conn.
Miss Georgia P. Foster,	" "	29 Buckingham St., " "
Miss Julia Phelon,	Mrs. Fenstner,	Charleston, S. C.

Class of 1906.

Miss Anna Prucha,	Mrs. John Grabba,	2361 Highland Ave., Norwood, Ohio.
Miss Theo S. Harrison,	Mrs. Rodgers,	Newmarket, Ont.
Miss Ella E. Reed,.	Mrs. James Goodrich,	104 Main St., Hartford, Conn.
Miss Elizabeth Garland,	Private nurse,	Middletown, Conn.
Miss Agnes E. Daniel,	" "	29 Buckingham St., Hartford, Conn.
Miss Mary Dempsey,	" "	Brockton, Mass.
Miss Nellie J. Beardsley,	" "	90 Buckingham St., Hartford, Conn.
Mrs. Mildred P. Hough,	" "	29 " " " "
Miss Ida Fissi,	" "	940 Farmington Ave., W. Hartford.
Miss Alice L. Bruton,	" "	East Hartford, Conn.
Miss Margaret Edgerton,	" "	47 Niles St., Hartford, Conn.
Miss Catherine R. Peers,	" "	29 Buckingham St., Hartford, Conn.
Miss Mabel O. Whitney,	" "	Enfield, Conn.
Miss Carlotta Pardee,	Mrs. Rice,	Westfield, Mass.
Miss Palmyre Bachand,	Private nurse,	13 Columbia St., Hartford, Conn.
Miss Catherine P. Annable,	" "	29 Buckingham St., " "
Miss Grace W. Bunce,	" "	114 Capitol Ave., " "

Class of 1907.

Miss Emily Barber Prior,	Private nurse,	Warehouse Point, Conn.
Miss Helen Bell Emerson,		Belleville, Ont.

Class of 1907.—Continued.

Name.	Occupation.	Residence.
Miss Leah Miller,	Private nurse,	436 Prospect Ave., Hartford, Conn.
Miss Kate Eliza Golding,	T. B. visiting nurse,	786 East 22d St., Paterson, N. J.
Miss Lillian Eugenie Smith,	Mrs. Jessie Shaw,	31 Daytona St., Springfield, Mass.
Miss Annie Florence Currie,	Private nurse,	47 Niles St., Hartford, Conn.
Miss Henriette Alice Tucker,	" "	90 Buckingham St., Hartford, Conn.
Miss Edith May Gridley,	" "	Southington, Conn.
Miss Annie Alterton Emery,	" "	90 Buckingham St., Hartford, Conn.
Miss Lucy Goodwin Porter,	Mrs. Charles T. Beach,	34 Collins St., " "
Miss Charlotte Morris Page,	Head nurse,	Hartford Hospital, " "
Miss Minnie Eva Hollis,	Visiting nurse,	124 Windsor Ave., " "
Miss Margaret Isabelle Powers,		St. Johns, N. B.
Miss Margaret Mary Hegarty,	Private nurse,	29 Buckingham St., Hartford, Conn.

Class of 1908.

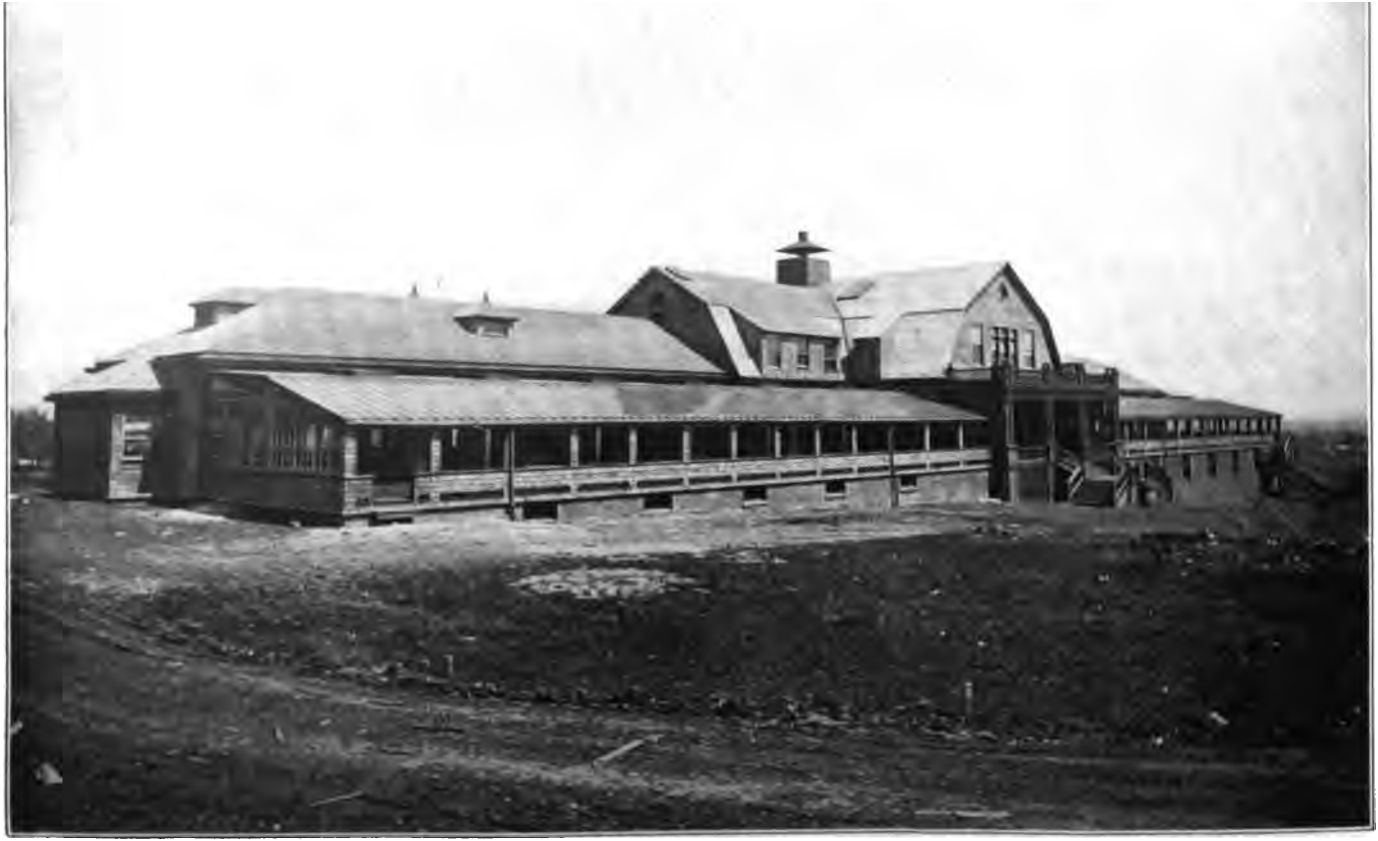
Name.	Occupation.	Residence.
Miss Ida Belle Whitbeck,	Private nurse,	78 West 94th St., New York City.
Miss Florence Emily MacKenzie,	" "	29 Buckingham St., Hartford, Conn.
Miss Julia Johnson,	" "	35 Walnut St., New Britain, Conn.
Miss Maud Louise Clark,	Mrs. G. E. Ashley,	22 Standish St., Hartford, Conn.
Miss Lillie Roe Davis,	Mrs. G. A. Smith,	158 High St., " "
Miss Lavinia Elizabeth Embleton,	Private nurse,	Malden, Mass.
Miss Olive Antoinette Eddy,	Asst. Supt., University Hospital,	Charlottesville, Va.
Miss Louise Maud Pinder,	Private nurse,	Prince Rupert, B. C.
Miss Mazie Keating,	" "	90 Buckingham St., Hartford, Conn.
Miss Elizabeth Helen Hennessey,	" "	29 " " " "
Miss Mary Lincoln Streeter,	" "	Malden, Mass.

Miss Ethel Soby,	Mrs. A. H. Griswold,	156 High St., Hartford Conn.
Miss Maud Dorcas Minds,	Private nurse,	29 Buckingham St., " "
Miss Nellie Beatrice Armstrong,	Mrs. J. C. Wilson,	164 High St., " "
Miss Esther Charlotte Johnson,	Private nurse,	57 Allen Place, " "
Miss Edith Louise Leonard,	Mrs. E. A. Hotchkiss,	65 Windsor Ave., " "
Miss Frances Jean Jenkins,	Private nurse,	St. John, N. B.
Miss Hazel Ballou Twiss,	Head nurse,	Hartford Hospital, Hartford, Conn.
Miss Lucy Agnes Quinlan,	" "	" " " "

Class of 1909.

Miss Elizabeth M. McKechnie,	Private nurse,	84 Seymour St., Hartford, Conn.
Miss Ethel B. Tufts,	Nurse,	Hartford Hospital, " "
Miss Edith F. Guildford,	School nurse,	So. Manchester, Conn.
Miss Alice L. Cummings,	Resident nurse,	Havergal College, Toronto, Ont.
Miss Delia L. Wiencke,	Head nurse,	Hartford Hospital, Hartford, Conn.
Miss Laura Hyman,	Private nurse,	38 Washington Pl., New York City.
Miss Myrtle A. Dickerman,	" "	90 Buckingham St., Hartford, Conn.
Miss Eva Styring,	" "	29 " " " "
Miss Rosamond E. Doane,	" "	45 Farmington Ave., " "
Miss Addie M. Lang,	Visiting nurse,	Yorktown Heights, N. Y.
Miss Maude A. Miles,	Private nurse,	782 Dudley St., Dorchester, Mass.
Miss Lena G. Ferris,	" "	37 Raymond St., Hartford, Conn.
Miss Ellen E. Drisko,	" "	37 " " " "
Miss Mary T. Shannon,	" "	37 " " " "
Miss Eva M. Lloyd,	Nurse,	Hartford Hospital, " "

UofM



HARTFORD HOSPITAL TUBERCULAR ANNEX — South Front.

HARTFORD HOSPITAL - TUBERCULAR ANNEX.

Recreation Grove, mostly Pines, protecting building from northwest winds.

WILDWOOD SANATORIUM

COMMITTEE AND OFFICERS IN CHARGE.

Committee.

WILLIAM D. MORGAN, M.D., *Chairman*, 49 Pearl St.
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FREDERIC S. CROSSFIELD, M.D.

Resident Physician.

WILLIAM B. BARTLETT, M.D.

Superintendent Hartford Hospital Training School for Nurses.

Miss LAUDER SUTHERLAND.

Matron.

Miss AGNES C. KERNAN.

REPORT OF THE RESIDENT PHYSICIAN, AND STATISTICS OF THE WILDWOOD SANATORIUM, FOR THE YEAR ENDING SEPTEMBER 30, 1909.

To the Executive Committee of the Hartford Hospital:

GENTLEMEN: I respectfully submit the following report and statistics of the Wildwood Sanatorium for the fiscal year ending September 30, 1909:

Number of patients present October 1, 1908,	49
Number of patients admitted during the year,	106
Total number of patients treated during the year,	155
Number of patients discharged during the year,	111
Number of patients remaining September 30, 1909,	44
Daily average number of patients under treatment,	49
Number of days' treatment given,	17,938
Average number of days' residence for each patient,	116
Daily cost per capita,	$1.37½

The one hundred and six patients admitted during the year may be classified as follows:

Incipient cases,	29	27%
Moderately advanced cases,	60	57%
Far advanced cases,	13	12%
Non-tuberculous,	4	4%
	106	100%

One hundred and eleven patients were discharged during the year; of these there were:

Discharged apparently cured,	10	9%
Discharged with disease arrested,	30	27%
Discharged improved,	39	36%
Discharged unimproved or progressive,	28	25%
Discharged as non-tuberculous,	4	3%
	111	100%

The residence of these patients varied from one day to twenty-three months. The average number of days residence was 176.

The following tables show the results of treatment more in detail. All patients are divided into two classes depending on the length of stay at the Sanatorium:

CLASS 1.

Forty-one patients who remained three months or less.

CONDITION ON ADMISSION.	CONDITION ON DISCHARGE.			Totals.
	Arrested.	Improved.	Unmproved.	
Incipient, ...	3	14	2	19
Moderately advanced, . .	..	11	3	14
Far advanced, ...	..	2	2	4
Non-tuberculous, ...	..	..	..	4
Totals, ...	3	27	7	41

The residence of these patients varied from one to eighty-nine days. Average residence, 44 days.

CLASS 2.

Seventy patients who remained from three to twenty-three months. Average residence two hundred and fifty-three days, or eight months.

CONDITION ON ADMISSION.	CONDITION ON DISCHARGE.				Totals.
	Apparently cured.	Arrested.	Improved.	Unimproved.	
Incipient, ...	7	5	..	..	12
Moderately advanced, .	3	21	11	16	51
Advanced, ...	..	1	1	5	7
Totals, ...	10	27	12	21	70

The effect of treatment upon bacilli and weight is shown in the following table, which includes patients in both classes:

	When admitted.	When discharged.
Number of patients whose expectorations contained tubercle bacilli, ...	74	54
Number who either had no bacilli or no expectoration, ...	37	57
Totals, ...	111	111

	During stay at Sanatorium.	Average gain per patients lbs.	Average loss per patients lbs.
Number of patients who gained weight,	92	13.4	
Number who lost weight, . . .	13		4.3
Number who remained stationary, . .	5		
Number not weighed, ...	1		

Greatest gain,	33½ lbs.	Greatest loss,	10 lbs.
Smallest gain,	½ lb.	Smallest loss,	½ lb.

The following table is of interest, as it shows the extent of the work at the Sanatorium since it was reopened in October, 1905:

	1905-06	1906-07	1907-08	1908-09
Total admissions, ...	102	110	101	106
Incipients, ...	49	51	32	27
Moderately advanced, . . .	31	48	57	57
Far advanced, ...	21	10	7	13
Non-tuberculous, ...	1	1	5	4
Total discharges, ...	83	79	85	111
Apparently cured, ...	10	2	5	10
Disease arrested, ...	12	9	17	30
Improved, ...	27	34	21	39
Unimproved or progressive, . .	34	34	37	28
Total number of patients treated, .	102	153	135	155
Average daily number of patients, .	32	39	41	49
Daily cost per capita, . . .	$1.41	$1.55	$1.40	$1.38

The diminution in the number of incipient cases admitted during the past four years is more apparent than real and is due to the adoption of the standard of classification advised by the National Association for the Study and Prevention of Tuberculosis. This classification places many cases in the moderately advanced class which previously were included under incipient. The increased number of cases discharged arrested and improved the past two years, bears witness to the truth of this statement.

Although there has been no material increase in the number of admissions to the Sanatorium during these four years, yet there has been a steady increase in the daily average number of patients. This shows that the patients have gradually come to realize that a longer stay at the Sanatorium is desirable in order to obtain good results. This past year the Sanatorium has been kept running to its full capacity of fifty beds nearly continuously.

There are still, however, many patients who remain with us only a short time; this year over one-third remained less than three months. This is due, in part at least, to two causes. First, it has been our custom to admit patients for diagnostic purposes, in order that they may be carefully watched, frequently examined and, if necessary, tested with tuberculin. Such observation cases, if found to be non-tuberculous, are discharged in a few days. Second, we have admitted, when we had several empty beds, a small number of advanced cases in order that they may learn from observation how best to care for themselves when they return home. Such advanced cases are not allowed to remain if these beds are needed for early and curable cases. Such facts as they learn at the Sanatorium are of great value to them when they return home, both in adding to their comfort and in preventing the spread of the disease to their relatives and friends. It is not alone in the cures that it turns out, that a sanatorium is of benefit to the community, but by its educative influence, as well.

The number of patients discharged apparently cured must necessarily remain small in all reports. The term "apparently cured" means entire absence of symptoms and pulmonary signs *for three months* before discharge. Very few patients feel that they can remain under treatment for this length of time after they appear to themselves to be perfectly well; as a rule such cases leave the Sanatorium to complete the cure at home or at work.

In the last four years we have discharged three hundred and fifty-eight patients. This year attempts have been made to locate these patients and receive reports from them regarding their condition. This task is a very difficult one on account of the constant change of residence of many of them, and because no determined effort has been made previously to keep in touch with patients. We have, however, met with fair success in our endeavor and the replies we have received have been, on the whole, quite encouraging. Our efforts in this direction will be continued this coming year and I hope to be able by next year to make a report on the condition of all our discharged patients.

In December we commenced giving tuberculin therapeutically to five patients. This method of treatment has been given continuously since then to a small number of patients. We have used the bouillon filtrate of Denys, given hypodermatically, in gradually increasing doses, after the method of Trudeau. Too few cases have been treated in this way to make a separate report on them of any value this year. The treatment has certainly done no harm in any case, and it is my impression that several have been distinctly benefited.

A number of changes and improvements have been made this past year which add greatly to the comfort and welfare of the patients. Early in the fall, through the generosity of one of our Advisory Medical Board, reclining chairs were obtained for all our patients. This adds greatly to their comfort while taking the cure in the winter and makes confinement to the veranda for such as are not allowed exercise, much less of a hardship. This summer we had a gift of two dozen hammocks which, when hung in the grove, serve the same purpose in summer as the chairs in winter. The halls have been painted, a new ice box built and iron lockers put in to replace the old wooden ones. The new lockers are placed in the wards, and the old locker room is to be used for an additional wash room and dressing room.

Of course we still have many needs, greatest of all, a large dining room. The dining rooms at present will not accommodate all our patients. An assembly hall would add greatly to the enjoyment of our patients. A little grading on the south side of the building would make the surroundings more attractive and the approach less difficult for automobiles.

We again cordially invite the public to inspect our building and observe how we are carrying the work along. A descriptive booklet has been prepared which will be sent to any one desiring information about the Sanatorium.

A detailed report of each patient discharged during the year, prepared in accordance with the suggestions of the National Association for the Study and Prevention of Tuberculosis, is appended.

Respectfully submitted,

William Bradford Bartlett, M.D.,

Resident Physician.

ENTERTAINMENTS.

November 26, 1908, Thanksgiving Dinner with special menu and table decorations.

December 25, 1908, Christmas Dinner with special menu, table decorations and gift for each patient.

December 31, 1908, New Year's Eve Entertainment, music, recitations, Christmas tree and distribution of gifts.

January 1, 1909, New Year's Dinner with special features.

May 11, 1909, an entertainment of songs by Concordia Quartette and Mr. McNulty. Reading by Mr. Robert McGee, and selections by Children's Orchestra from South Park M. E. Church Sunday School.

August 15, 1909, Moonlight Picnic and Watermelon Party in the grove.

The following ministers and other gentlemen conducted religious services at various times during the year:

Rev. Dr. E. A. Dent, Rev. Richard J. Carroll, Mr. W. C. Butler, Mr. E. F. Jennings, Mr. C. A. Lippitt, Mr. E. R. Gordon, Mr. W. Hilton.

Misses Grace Knox, Irene Tansley, Mrs. A. C. Rose, Mrs. W. E. Brown, Mrs. Pomroy and Mrs. Farrar furnished special music at the services.

The majority of the services were arranged by a committee from the South Park M. E. Church Sunday School through the great kindness of Mr. W. E. Brown.

DONATIONS TO WILDWOOD SANATORIUM.

Hartford Branch of American Needle Work Guild, clothing.

Union service of South Baptist, Fourth Congregational, First Baptist Churches, Thanksgiving offering, $11.05.

Dr. C. T. Millet, Brockton, Mass., $5.00.

Dr. F. S. Crossfield, $3.00 Christmas entertainment.

Dr. F. S. Crossfield, croquet set.

Kingsley & Smith, $5.00 Christmas entertainment.

Kingsley & Smith, two boxes of oranges.

Mrs. George L. Vannais, Christmas tree decorations.

Mrs. W. B. Bartlett, puzzles and games.

Mrs. John M. Holcombe, books and music.

Mrs. Annie Liddon, books.

Mr. C. A. Hawkes, sleigh ride for patients.

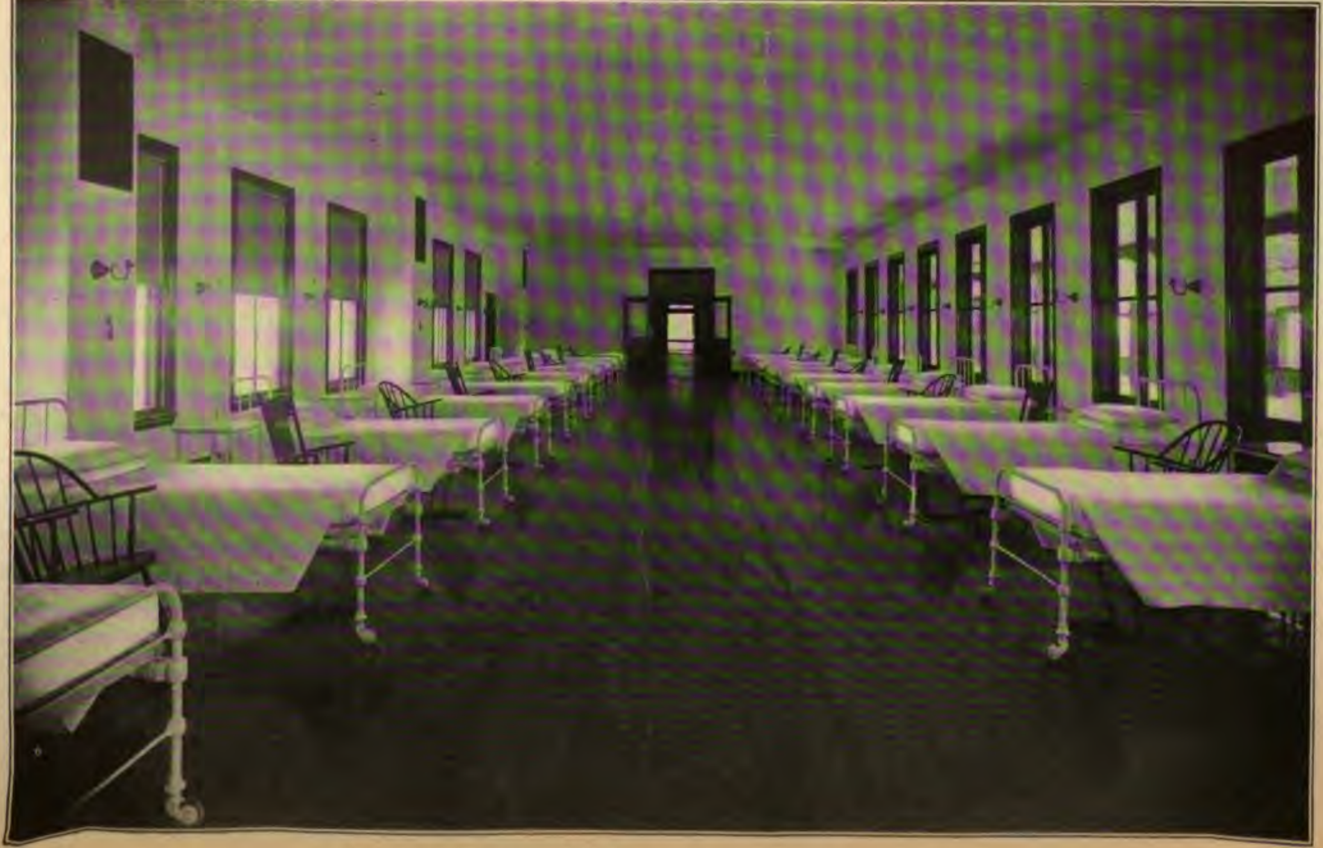
Woman's Club of Ellington, Conn., "Dr. Gulick's Efficient Life."

Mrs. L. B. Cochran, puzzles.

Miss Wilkinson, subscription to Munsey's and McClure's magazines.

Rev. J. J. Broderick, subscription to *Hartford Post* and *Sunday Globe.*

The Russell Co., Cambridge, Mass., subscription to *Hartford Post* and *Globe*
Mrs. E. A. Drake, flowers.
Deep River Wheel Club, magazines.
Peter Henderson & Co., flower seeds, plants.
Mr. A. Chase, croquet set.
Mr. John F. Gunshanan, subscription to the *Hartford Times*.
Mrs. J. Howard Ford, Stony Ford, Orange Co., N. Y., 25 hammocks.
Mr. C. S. Gates, magazines.
Mr. Austin R. Bill, magazines.
Mr. John Buckley, New Britain, books, graphophone records.
Mrs. E. P. Jackes, Toronto, Can., $2.00 for entertainment.



HARTFORD HOSPITAL.—TUBERCULAR ANNEX.—Female Ward.

DEFINITIONS OF TERMS EMPLOYED.

The definitions below are those recommended by the Nomenclature Committee of the National Association for the Study and Prevention of Tuberculosis, to give a basis for comparison of results of the several institutions engaged in this work.

I. *Incipient (favorable).*

Slight initial lesion in the form of infiltration limited to the apex or a small part of one lobe.

No tuberculous complications. Slight or no constitutional symptoms (particularly including gastric or intestinal disturbances, or rapid loss of weight).

Slight or no elevation of temperature or acceleration of pulse at any time during the 24 hours, especially after rest.

Expectoration usually small in amount, or absent. Tubercle bacilli may be present or absent.

II. *Moderately Advanced.*

No marked impairment of function, either local or constitutional.

Localized consolidation moderate in extent, with little or no evidence of destruction of tissue; or disseminated fibroid deposits.

No serious complications.

III. *Far Advanced.*

Marked impairment of function, local and constitutional.

Localized consolidation intense; or disseminated areas of softening or serious complications.

IV. *Acute Miliary Tuberculosis.*

I. *Progressive (unimproved).*

All essential symptoms and signs unabated or increased.

II. *Improved.*

Constitutional symptoms lessened or entirely absent. Physical signs improved or unchanged. Cough and expectoration with bacilli usually present.

III. *Arrested.*

Absence of all constitutional symptoms — expectoration and bacilli may or may not be present; physical signs stationary or retrogressive; the foregoing conditions to have existed *two* months.

IV. *Apparently cured.*

All constitutional symptoms and expectoration with bacilli absent for at least *three* months; the physical signs to be those of a healed lesion.

V. *Cured.*

All constitutional symptoms and expectoration with bacilli absent for at least two years under ordinary conditions of life.

For more complete comparison these cases have been classified according to Turban; the extent of the lung involvement being expressed as follows:

I. Slight lesion extending at most to the volume of one lobe or two half lobes.

II. Slight lesion extending further than "I," but at most to the volume of two lobes; or severe lesion extending at most to the volume of one lobe.

III. All lesions which in the extent of the parts affected exceed "II."

LIST OF PATIENTS DISCHARGED AT WILDWOOD SANATORIUM FROM OCT. 1, 1908, TO SEPT. 30, 1909.

Report prepared in accordance with the suggestions of the National Association for the Study and Prevention of Tuberculosis.

Number, Sex and Age.	Date of Admission and Discharge.	Weight.	Condition.	Involvement.	Side.	Duration of disease in months.	General Condition.	Digestion.	Range of Pulse 7 days on admission; 2 days on discharge.	Aver. Max. Tem. 7 days on admission; 2 days on discharge.	T.B.	Complications.	Tuberculin.
1	August 18, 1908	98	Incipient	I	R.	1	Favorable	Unimpaired	80–100	99.2	o	Pleuritis	Percutaneous test +
F. 35	October 11, 1908	118	Improved	I	R.	3	Favorable	Unimpaired	80–100	98.6	o		
2	June 20, 1908	131	Mod. adv.	II	R. & L.	24	Favorable	Unimpaired	80–105	98.6	+		
M. 32	October 14, 1908	138	Improved	II	R. & L.	28	Favorable	Unimpaired	80–100	98	+		
3	September 19, 1908	95½	Incipient	I	R. & L.	3	Favorable	Unimpaired	80–100	98.6	+		Percutaneous test o
F. 29	October 17, 1908	98½	Improved	I	R. & L.	4	Favorable	Unimpaired	80–84	98.4	+		
4	February 17, 1907	96	Mod. adv.	II	R.	8	Favorable	Unimpaired	70–120	99.5	+	Pneumothorax	
M. 17	October 22, 1908	117½	Progressive	III	R. & L	28	Unfavorable	Impaired	140–150	103.	+		
5	July 29, 1908	131	Mod. adv.	II	L.	2	Favorable	Unimpaired	90–100	101.	+		
M. 28	October 22, 1908	144	Improved	II	L.	5	Unfavorable	Unimpaired	90–100	99.5	+		
6	November 14, 1907	145½	Mod. adv.	II	L.	30	Favorable	Unimpaired	86–110	98.	+		
F. 35	October 26, 1908	136	Improved	II	L.	41	Favorable	Unimpaired	86–110	99.2	+		
7	May 6, 1907	91½	Mod. adv.	II	R. & L.	6	Favorable	Unimpaired	70–100	98.4	+		
F. 40	November 2, 1908	111½	Arrested	II	R. & L.	26	Favorable	Unimpaired	70–80	99.	+		
8	March 20, 1908	128	Mod. adv.	II	R. & L.	4	Unfavorable	Unimpaired	80–100	98.	+		
M. 18	November 3, 1908	125	Unimproved	II	R. & L.	11	Unfavorable	Unimpaired	60–70	98.	+		
9	April 11, 19 8	111	Mod. adv.	II	R. & L.	2	Favorable	Unimpaired	76–100	98.4	o		
F. 38	November 6, 1908	119½	Arrested	II	R. & L.	9	Favorable	Unimpaired	80–100	99.	o		
10	May 17, 1908	100	Advanced	III	R. & L.	10	Unfavorable	Impaired	80–105	100.	+		
F. 39	November 7, 1908	104½	Unimproved	III	R. & L.	16	Unfavorable	Impaired	80–110	100.5	+		
11	May 6, 1908	130	Mod. adv.	II	L.	7	Favorable	Unimpaired	80–100	100.	+		
M. 59	November 12, 1908	135	Unimproved	III	L.	13	Unfavorable	Unimpaired	80–100	98.6	+		

12	August	14, 1908	110	Advanced	III	R. & L.	16	Unfavorable	Impaired	90–120	100.	+	....	....
F. 30	November	15, 1908	112	Unimproved	III	R. & L.	19	Unfavorable	Impaired	100–120	100.5	+	....	....
13	June	13, 1908	71	Advanced	III	R. & L.	9	Unfavorable	Unimpaired	80–110	100.6	+	....	....
M. 13	November	21, 1908	70½	Progressive	III	R. & L.	14	Unfavorable	Impaired	110–120	100.0	+	....	....
14	May	11, 1908	124	Mod. Adv.	II	L.	8	Favorable	Unimpaired	100–120	99.	+	Myocardial weakness	....
F. 38	November	24, 1908	139	Ap. cured	......	....	15	Favorable	Unimpaired	80–86	98.	o	Chronic salpingitis	....
15	June	19, 1908	111	Mod. Adv.	II	R.	10	Favorable	Unimpaired	80–90	99.	+	....	....
M. 38	November	28, 1908	137½	Improved	II	R. & L.	15	Favorable	Unimpaired	80–90	99.	+	....	....
16	May	15, 1908	120	Mod. adv.	II	R. & L.	36	Favorable	Unimpaired	80–100	99.6	+	....	....
M. 43	January	6, 1909	124	Unimproved	II	R. & L.	44	Unfavorable	Impaired	80–96	94.4	+	....	....
17	July	24, 1908	126¼	Incipient	I	L.	1	Favorable	Unimpaired	100–120	97.4	+	....	....
F. 18	January	6, 1909	149½	Arrested	I	L.	7	Favorable	Unimpaired	80–86	97.6	o	....	....
18	April	13, 1908	113	Mod. adv.	II	R.	9	Favorable	Unimpaired	80–90	98.6	+	Psoas abscess	....
F. 29	January	8, 1909	133½	Unimproved	II	R.	18	Favorable	Unimpaired	98–106	101.8	o	....	....
19	August	27, 1908	106½	Mod. adv.	II	R. & L.	1	Favorable	Unimpaired	80–100	99.8	+	....	....
M. 17	January	29, 1909	104¼	Progressive	III	R. & L.	6	Unfavorable	Impaired	80–100	102.	+	....	....
21	September	2, 1908	126	Mod. adv.	II	L.	1½	Favorable	Unimpaired	90–104	98.8	+	....	....
M. 43	January	31, 1909	135¾	Unimproved	II	R. & L	6½	Unfavorable	Unimpaired	100–104	98.6	+	....	....
22	November	11, 1907	120½	Mod. adv.	I	R. & L.	2	Favorable	Unimpaired	60–98	98.	o	Jaundice Sub-deltoid bursitis.	....
M. 43	February	2, 1909	130½	Arrested	I	R. & L.	16	Favorable	Unimpaired	80–90	98.6	o	Bronchitis	....
23	August	24, 1908	128½	Mod. adv.	II	R. & L.	48	Unfavorable	Unimpaired	84–110	99.5	+	....	....
M. 22	February	3, 1909	133¾	Unimproved	II	R. & L.	53	Unfavorable	Unimpaired	90–104	98.6	+	....	....
24	January	8, 1909	113	Mod. adv.	II	R. & L.	2	Unfavorable	Impaired	80–120	101.	+	....	....
M. 26	February	4, 1909	104	Progressive	II	R. & L.	3	Unfavorable	Impaired	90–100	101.	+	....	....
25	August	28, 1909	103	Incipient	I	R.	36	Favorable	Unimpaired	80–100	98.6	o	....	Subcutaneous test
F. 20	February	4, 1909	117	Ap. cured	o	....	43	Favorable	Unimpaired	80–96	98.6	o	....	+
26	November	5, 1908	140	Mod. adv.	II	L.	5	Favorable	Unimpaired	80–96	99.	+	....	....
M. 28	February	12, 1909	146	Improved	II	L.	8	Favorable	Unimpaired	90–100	98.7	+	....	....
27	July	9, 1908	134¼	Mod. adv.	II	R. & L.	24	Favorable	Unimpaired	80–100	98.6	+	Chronic nephritis	....
M. 42	February	18, 1909	148¾	Arrested	II	R. & L.	31	Favorable	Unimpaired	80–96	98.2	+	Fistula in ano	....

Number, Sex and Age.	Date of Admission and Discharge.	Weight.	Condition.	Involvement.	Side.	Duration of disease in months.	General Condition.	Digestion.	Range of Pulse 7 days on admission; 2 days on discharge.	Aver. Max. Temp. 7 days on admission; 2 days on discharge.	T. B.	Complications.	Tuberculin.
28 F. 26	February 1, 1909 February 18, 1909	93½ 91	Incipient Unimproved	I I	L. L.	3 3	Favorable Favorable	Unimpaired Unimpaired	80-100 80-100	98.6 98.8	o o	Neurasthenia Mucous colitis	....
29 M. 30	November 19, 1908 February 20, 1909	144 155	Mod. adv. Progressive	I II	R. & L. R. & L.	4½ 7½	Favorable Unfavorable	Unimpaired Impaired	84-96 80-100	99.5 100.	+ +	Recurrent hemoptysis	....
30 M. 25	February 22, 1909 February 25. 1909	102½ 102½	Incipient Unimproved	I I	L. L.	2 2	Favorable Favorable	Unimpaired Unimpaired	64-84 64-84	98.4 98.4	o o	....	....
31 F. 34	July 29, 1908 March 2, 1909	125 120½	Mod. adv. Progressive	II II	R & L. R. & L.	6 13	Favorable Unfavorable	Unimpaired Impaired	90-100 96-104	99.6 98.6	+ +	Pleurisy with effusion	....
32 F. 19	December 21, 1908 March 6, 1909	117 129¾	Incipient Arrested	I	R.	8 10	Favorable Favorable	Unimpaired Unimpaired	90-108 90-100	98.4 98.6	o o	Asthma	Von Pirquet + Subcutaneous test+
33 F. 39	November 5, 1908 March 6, 1909	115 112¼	Incipient Ap. cured	I	R.	7 11	Favorable Favorable	Unimpaired Unimpaired	80-90 80-86	98.6 98.6	o o	Mitral and Aortic insufficiency	Subcutaneous test +
34 M. 49	July 1, 1908 March 8, 1908	105 137	Incipient Arrested	I I	R. & L. R. & L.	2 10	Unfavorable Favorable	Unimpaired Unimpaired	80-100 90-92	101. 98.6	+ o	Mitral Insufficiency	....
35 F. 23	November 8, 1908 March 15, 1909	49½ 99½	Incipient Arrested	I I	R. & L. L.	24 28	Favorable Favorable	Unimpaired Unimpaired	80-100 80-98	98.6 98.7	o o	....	Therapeutic B. F. Six doses
36 M. 32	September 12, 1908 March 25, 1909	105 138½	Mod. adv. Arrested	II II	R. & L. R. & L.	48 54	Favorable Favorable	Unimpaired Unimpaired	70-90 80-90	98.6 98.6	+ +	....	Therapeutic B. F. 27 doses, 97 days .0032
37 F. 32	December 4, 1908 March 27, 1909	102¼ 119½	Mod. adv. Improved	I I	R. R. & L.	1 5	Favorable Favorable	Unimpaired Unimpaired	90-96 76-110	98.8 98.8	+ +	....	....
38 M. 38	May 26, 1908 March 27, 1909	117½ 147½	Mod. adv. Arrested	II I	R. & L. L.	2 12	Favorable Favorable	Unimpaired Unimpaired	80-100 84-96	99.4 98.6	+ +	....	....
39 F. 28	November 2, 1908 March 29, 1909	86 100	Advanced Improved	III III	R. & L. R. & L.	5 10	Unfavorable Unfavorable	Impaired Impaired	100-116 100-110	99.6 100.6	+ +	....	....
40 M. 30	September 30, 1908 April 1, 1909	132¼ 141½	Incipient Ap. cured	I	R. & L.	2 8	Favorable Favorable	Unimpaired Unimpaired	90-100 80-84	98 4 98.2	o o	Pleurisy with Effusion	....

41	April	5, 1909	92	Mod. adv.	II	R. & L.	24	Favorable	Unimpaired	110-120	98.6			
F. 22	April	6, 1909	92	Unimproved	II	R. & L.	24	Favorable	Unimpaired	110-120	98.6			
42	December	14, 1908	96¾	Mod. adv.	II	R. & L.	24	Favorable	Unimpaired	90-120	97.	+	Meningitis	
M. 23	April	9, 1909	101¾	Unimproved	II	R. & L.	28	Unfavorable	Impaired	60-76	102.	+		
43	October	19, 1908	116¾	Mod. adv.	I	L.	3	Favorable	Unimpaired	80-90	98.6	+		
F. 36	April	9, 1909	145	Improved	II	L. & R.	9	Favorable	Unimpaired	84-96	98.8	+		
44	May	24, 1908	101	Advanced	III	R. & L.	8	Favorable	Unimpaired	100-120	99.4	+	Eczema	
F. 27	April	13, 1909	100¼	Unimproved	III	R. & L.	19	Unfavorable	Unimpaired	90-120	99.6	+		
45	February	17, 1909	99½	Advanced	III	L. & R.	4	Unfavorable	Unimpaired	100-120	100.5	+		
M. 23	April	13, 1909	96	Unimproved	III	R. & L.	6	Unfavorable	Impaired	100-120	102.	+		
46	June	29, 1908	109¼	Mod. adv.	II	R. & L.	3	Unfavorable	Impaired	100-126	100.	+		
F. 28	April	13, 1909	119	Improved	III	R. & L.	12	Unfavorable	Unimpaired	100-120	99.5	+		
47	March	30, 1909	123	Mod. adv.	II	L.	1	Unfavorable	Unimpaired	80-100	98.6	o		
F. 43	April	10, 1909	128	Improved	II	L.	1½	Unfavorable	Unimpaired	80-100	98.0	o		
48	March	24, 1909	121	Incipient	I	L.	12	Favorable	Unimpaired	70-90	98.8			Von Pirquet and conjunctival tests both +
M. 19	April	23, 1909	138	Improved			13	Favorable	Unimpaired	66-80	98.4			
49	March	19, 1908	116	Advanced	III	R. & L.	6	Favorable	Unimpaired	80-110	98.6	+		
M. 35	April	26, 1909	115	Unimproved	III	R. & L.	17	Unfavorable	Unimpaired	84-110	99.	+		
50	February	3, 1909	149½	Incipient	I	L.	14	Favorable	Unimpaired	80-100	98.8	+		Therapeutic B. F.
M. 22	April	27, 1909	160	Arrested			17	Favorable	Unimpaired	76-94	99.	o		19 doses .000068
51	September	26, 1908	98	Mod. adv.	I	R. & L.	9	Unfavorable	Impaired	84-100	99.	o	Recurrent hemoptysis	
F. 39	April	28, 1909	122	Improved	I	R. & L.	16	Favorable	Unimpaired	90-98	98.	o		
52	August	21, 1908	119	Mod. adv.	II	R. & L.	6	Favorable	Unimpaired	70-80	98.6	+	Pyelitis	
M. 44	April	30, 1909	151½	Arrested	II	R. & L.	14	Favorable	Unimpaired	64-80	98.4	o		
53	August	13, 1907	134	Mod. adv.	II	R. & L.	2	Favorable	Unimpaired	70-105	99.2	+		Therapeutic B. F.
M. 24	May	2, 1909	160	Arrested	I	R. & L.	22	Favorable	Unimpaired	76-90	98.2	o		35 doses .1
54	February	28, 1908	135	Far advanced	III	R. & L.	24	Unfavorable	Impaired	80-115	98.1	+		
M. 35	May	3, 1909	136	Arrested	III	R & L.	38	Favorable	Unimpaired	78-90	98.0	o		
55	February	9, 1909	138	Mod. adv.	II	L.	12	Unfavorable	Unimpaired	82-108	99.	+		
F. 58	May	3, 1909	136	Improved	II	L.	15	Favorable	Unimpaired	84-100	99.	+		

Number, Sex and Age.	Date of Admission and Discharge.	Weight.	Condition.	Involvement.	Side.	Duration of Disease in months.	General Condition.	Digestion.	Range of Pulse 7 days on admission; 2 days on discharge.	Aver. Max. Temp. 7 days on admission; 2 days on discharge.	T. B.	Complications.	Tuberculin.
56 F. 17	July 15, 1908 May 3, 1909	80½ 74	Mod. adv. Progressive	II III	R. & L. R. & L.	36 46	Unfavorable Unfavorable	Unimpaired Impaired	100–130 110–150	99.4 103.5	+ +	....	....
57 F. 22	August 7, 1908 May 10, 1909	105 123	Advanced Unimproved	II II	R. & L. R. & L.	8 17	Favorable Unfavorable	Unimpaired Unimpaired	100–120 94–110	99.4 100.	+ +	Tuberculous laryngitis	....
58 M. 60	June 7, 1907 May 13, 1907	148 165	Mod. adv. Arrested	II I	R. & L. L.	6 30	Favorable Favorable	Unimpaired Unimpaired	70–115 76–90	99. 98.6	+ +	Emphysema	....
59 M. 28	October 16, 1908 May 14, 1909	143 162	Mod. adv. Arrested	I I	R. R.	24 31	Favorable Favorable	Unimpaired Unimpaired	80–100 84–100	98.6 98.6	+ o	....	Therapeutic B. F. 37 doses .0047.
61 F. 9	November 8, 1908 May 22, 1909	64 80¼	Mod. adv. Arrested	I I	L. L.	1 7	Favorable Favorable	Unimpaired Unimpaired	76–90 76–90	98.8 98.8	o	....	....
62 F. 19	April 16, 1909 May 23, 1909	120½	Advanced Progressive	II III	R. & L. R. & L.	4 5	Favorable Unfavorable	Unimpaired Impaired	100–120 120–130	99.5 102.	+ +	Recurrent hemoptysis Congestion pneumonia	....
63 F. 29	March 4, 1908 May 23, 1909	88¼ 94	Mod. adv. Unimproved	II II	R. & L. R. & L.	24 36	Unfavorable Unfavorable	Unimpaired Unimpaired	110–130 106–130	99.2 100.4	+ +	....	....
64 F. 21	April 7, 1909 May 29, 1909	105 112¼	Mod. adv. Improved	I I	R. R.	7 9	Favorable Favorable	Unimpaired Unimpaired	98–110 70–100	99.4 98.6	+ +	....	....
65 F. 20	May 6, 1909 May 31, 1909	157⅛ 165	Incipient Improved	I I	R. R.	3 3½	Favorable Favorable	Unimpaired Unimpaired	90–110 98–100	98.6 98.	o o	....	....
66 M. 48	March 20, 1909 May 31, 1909	126 125	Mod. adv. Improved	I I	R. R.	36 38	Favorable Favorable	Impaired Unimpaired	90–110 90–100	99.6 98.4	+ +	....	....
67 F. 33	July 1, 1908 June 4, 1909	114 146	Mod. adv. Arrested	II II	R. & L. R. & L.	9 21	Favorable Favorable	Unimpaired Unimpaired	70–90 76–80	98.6 98.4	+ o	....	....
68 M. 10	February 20, 1909 June 5, 1907	70 71½	Mod. adv. Ap. cured	I I	L. L.	3 1	Favorable Favorable	Unimpaired Unimpaired	96–120 94–100	99. 98.2	+ o	....	....
69 F. 35	May 17, 1908 June 8, 1909	107 112	Mod. adv. Unimproved	II I	R. & L. R.	6 19	Favorable Unfavorable	Impaired Impaired	80–100 80–120	99. 98.8	o o	Neurasthenia Myocardial weakness	....

70	April	7, 1909	126½	Incipient	I	R.	5	Favorable	Unimpaired	70-90	98.6	+	......	......
M. 24	June	10, 1909	130	Improved	I	R.	7	Favorable	Unimpaired	70-90	98.	o	......	......
72	September	24, 1908	114	Mod. adv.	I	L.	6	Favorable	Unimpaired	96-110	99.2	+	......	Therapeutic, B. F 16 doses, 62 days .00001
M. 18	June	11, 1909	130	Improved	II	L.	15	Favorable	Unimpaired	90-100	98.	+	......	
73	May	2, 1909	134½	Incipient	I	R.	1	Favorable	Unimpaired	70-96	98.4	......	......	Von Pirquet test—o Subcutaneous test + at 3 mgm.
M. 31	June	22, 1909	143	Arrested	......	......	3	Favorable	Unimpaired	76-86	98.6	......	......	
74	April	8, 1909	132¾	Mod. adv.	I	R. & L.	3	Favorable	Unimpaired	80-106	99.8	+	......	......
M. 33	June	23, 1909	146½	Improved	I	R. & L.	5	Favorable	Unimpaired	84-110	99.0	+	......	......
75	April	24, 1909	130¾	Mod. adv.	II	R. & L.	4	Favorable	Unimpaired	70-94	98.4	+	......	Therapeutic, B. F.
M. 38	June	23, 1909	135½	Improved	II	R. & L.	6	Favorable	Unimpaired	70-100	99.	+	......	9 doses .00001
76	April	13, 1909	95	Incipient	I	R. & L.	1	Favorable	Unimpaired	90-100	99.2	+	......	Von Pirquet test +
F. 32	June	27, 1909	102	Arrested	I	R.	3	Favorable	Unimpaired	90-106	98.2	o	......	......
77	July	28, 1908	96	Mod. adv.	II	R. & L.	8	Unfavorable	Unimpaired	84-110	100.5	+	......	......
F. 25	June	28, 1909	127	Arrested	II	R. & L.	19	Favorable	Unimpaired	80-96	98.8	o	......	......
78	May	17, 1909	135¾	Mod. adv.	I	L.	7	Favorable	Unimpaired	76-100	99.2	o	......	......
F. 24	June	28, 1909	140	Arrested	I	L.	8½	Favorable	Unimpaired	80-96	99.	o	......	......
79	June	25. 1908	142	Incipient	I	L.	3	Favorable	Unimpaired	88-110	99.6	o	......	Therapeutic, B. F.
M. 17	July	1, 1909	154	Arrested	II	L.	15	Favorable	Unimpaired	80-90	98.0	+	......	42 doses 0.1
80	March	10, 1909	131	Mod. Adv.	II	R. & L.	6	Favorable	Unimpaired	84-112	101.	+	......	......
M. 22	June	29, 1909	142½	Improved	II	R. & L.	9	Favorable	Unimpaired	76-100	99.	+	......	......
81	February	26, 1909	127	Incipient	I	R.	31	Favorable	Unimpaired	80-106	98.	o	......	Therapeutic B. F.
F. 24	July	3, 1909	135	Arrested	I	R.	47	Favorable	Unimpaired	84-100	98.8	o	......	43 doses 0.1
82	November	2, 1908	101	Incipient	I	R.	1	Favorable	Unimpaired	80-100	99.2	o	......	Von Pirquet test +
F. 19	July	3, 1909	121½	Ap. cured	I	R.	9	Favorable	Unimpaired	64-76	98.4	o	......	......
83	February	17, 1909	124	Advanced	II	R. & L.	24	Unfavorable	Unimpaired	90-100	100.	+	......	......
M. 30	July	6, 1909	136	Arrested	II	R. & L.	29	Favorable	Unimpaired	80-120	98.8	+	......	......
85	June	17, 1909	146	Mod. Adv.	II	L.	1	Unfavorable	Unimpaired	70-90	99.2	o	Pleurisy with effusion	......
M. 31	July	21, 1909	148½	Improved	II	L.	2	Favorable	Unimpaired	70-100	98.8	o	......	......
86	June	10, 1909	89	Incipient	I	L.	5	Favorable	Unimpaired	70-100	98.4	......	Adenitis	......
F. 21	July	21, 1909	97	Improved	I	L.	6	Favorable	Unimpaired	80-94	98.4	......	......	......

Number, Sex and Age.	Date of Admission and Discharge.	Weight.	Condition.	Involvement.	Side.	Duration of Disease in months.	General Condition.	Digestion.	Range of Pulse 7 days on admission; 2 days on discharge.	Aver. Max. Temp. 7 days on admission; 2 days on discharge.	T. B.	Complications.	Tuberculin.
87	May 9, 1909	100	Incipient	I	R.	2	Favorable	Unimpaired	70-100	99.	o		Von Pirquet test +
F. 38	July 24, 1909	112½	Improved	I	R.	4½	Favorable	Unimpaired	82-94	98.6	o		
88	June 16, 1909	134	Mod. Adv.	II	R. & L.	24	Favorable	Unimpaired	70-90	98.4	+	Tuberculous laryngitis	
F. 43	July 30, 1909	142½	Improved	II	R. & L.	25	Favorable	Unimpaired	80-88	99.	+		
89	May 20, 1909	104	Advanced	II	R.	3	Unfavorable	Unimpaired	80-130	100.2	+		
F. 31	August 4, 1909	118	Improved	II	R. & L.	5½	Favorable	Unimpaired	94-108	99.	+		
90	November 21, 1908	118½	Mod. Adv.	II	R. & L.	7	Unfavorable	Unimpaired	80-100	99.5	+		
M. 46	August 7, 1909	121	Improved	II	R.	15½	Unfavorable	Unimpaired	84-94	98.6	+		
91	March 1, 1909	132	Mod. Adv.	I	R. & L.	3	Favorable	Unimpaired	64-80	98.6	+		Therapeutic B. F.
M. 41	August 8, 1909	145	Arrested	I	R & L.	8	Favorable	Unimpaired	70-84	98.6	o		37 doses; .032
92	October 22, 1908	125	Mod. Adv.	II	L.	2	Favorable	Unimpaired	90-110	98.6	+		Therapeutic B. F.
M. 28	August 10, 1909	136½	Arrested	II	L.	12	Favorable	Unimpaired	74-84	98.6	o		43 doses .22
93	January 1, 1909	130½	Mod. Adv.	II	R. & L.	12	Favorable	Unimpaired	84-110	97.4	+	Otitis media chronica	
M. 46	August 14, 1909	145	Arrested	II	R. & L.	19	Favorable	Unimpaired	90-110	99.	+		
94	July 5, 1909	120½	Incipient	I	L.	3	Favorable	Unimpaired	80-112	99.5	+		
F. 28	August 21, 1909	135	Improved	I	L.	5	Favorable	Unimpaired	80-90	99.	+		
95	July 1, 1909	90½	Incipient	I	R. & L.	2	Favorable	Unimpaired	70-100	99.	o		
F. 34	August 30, 1909	100½	Improved	I	R. & L.	4	Favorable	Unimpaired	80-100	99.	o		
96	April 26, 1908	106½	Mod. Adv.	II	R. & L.	12	Favorable	Unimpaired	70-110	98.6	+	Recurrent hemoptysis	
M. 18	September 1, 1909	110	Unimproved	III	R. & L.	28	Favorable	Unimpaired	110-120	98.8	+		
97	March 23, 1909	118	Mod. adv.	II	L.	4	Favorable	Unimpaired	100-120	99.2	+		
F. 22	September 1, 1909	150½	Ap. cured	I	L.	9	Favorable	Unimpaired	80-100	98.2	o		
98	April 1, 1909	139	Incipient	I	R.	4	Favorable	Unimpaired	80-100	99.2	o		Subcutaneous
M. 24	September 7, 1909	140	Ap. cured			9½	Favorable	Unimpaired	80-100	98.8	o		test +
99	March 15, 1909	153½	Mod. adv.	II	R. & L.	4	Favorable	Unimpaired	84-100	99.2	+		
M. 44	September 14, 1909	172	Arrested	II	R. & L.	10	Favorable	Unimpaired	84-94	98.8	+		

100	November 3, 1908	132	Mod. adv.	II	R. & L.	1	Favorable	Unimpaired	80-100	98.6	+	....	Therapeutic, B. F.
M. 43	September 20, 1909	152	Arrested	II	R. & L.	12	Favorable	Unimpaired	80-96	98.8	+	....	23 doses .000,032
101	July 13, 1909	105	Advanced	III	R. & L.	6	Unfavorable	Impaired	84-120	100.	+	Tuberculous	....
F. 34	September 20, 1909	104¼	Improved	III	R. & L.	8	Unfavorable	Unimpaired	100-134	101.5	+	Laryngitis	....
102	August 31, 1909	127¾	Incipient	I	R.	1	Favorable	Unimpaired	70-100	99.	+	....	....
F. 40	September 21, 1909	128	Improved	I	R.	2	Favorable	Unimpaired	76-100	99.2	+	....	....
103	August 12, 1909	131	Mod. adv.	I	R. & L.	2	Favorable	Unimpaired	70-86	98.6	o	....	....
M. 28	September 24, 1909	141	Improved	I	R. & L.	3	Favorable	Unimpaired	70-96	99.	o	....	....
104	September 17, 1908	120½	Incipient	I	L.	3	Favorable	Unimpaired	60-80	98.4	o	Chronic bronchitis	Subcutaneous
M. 49	September 24, 1909	144½	Ap. cured	......	....	15	Favorable	Unimpaired	74-76	97.8	o	and emphysema	test +
105	August 1, 1909	97	Incipient	I	R.	1	Favorable	Unimpaired	80-100	98.6	o	....	....
M. 17	September 25, 1909	111	Improved	......	....	3	Favorable	Unimpaired	80-96	98.6	o	....	....
106	April 19, 1909	117	Mod. adv.	I	R. & L.	6	Favorable	Unimpaired	60-80	98.8	+	....	Therapeutic, B. F.
F. 43	September 28, 1909	145	Arrested	I	R.	11	Favorable	Unimpaired	80-90	98.8	o	....	5 doses
107	September 21, 1909	118	Mod. adv.	I	R. & L.	1	Favorable	Unimpaired	70-100	98.	+	....	....
F. 22	September 28, 1909	118	Unimproved	I	R. & L.	1	Favorable	Unimpaired	70-74	98.	+	....	....
108	July 26, 1909	93½	Incipient	I	L.	4	Favorable	Unimpaired	74-100	99.	o	Pregnancy	Subcutaneous test+ Therapeutic, B. F.
F. 26	September 28, 1909	109	Imrpoved	I	L.	6	Favorable	Unimpaired	70-90	98.8	o	....	7 doses .000.01
109	February 8, 1909	121	Mod. adv.	II	R. & L.	1	Favorable	Unimpaired	90-116	98.4	+	....	....
F. 18	September 29, 1909	129	Arrested	II	R. & L.	8	Favorable	Unimpaired	98-110	98.6	+	....	....
110	May 13, 1909	100	Incipient	I	L.	1	Favorable	Unimpaired	90-120	99.5	o	Mitral insufficiency	....
F. 17	September 29, 1909	115	Ap. cured	......	....	5	Favorable	Unimpaired	90-120	98.6	o	....	....
111	August 26, 1909	101	Incipient	I	L.	6	Favorable	Unimpaired	70-100	98.8	......	....	....
F. 21	September 30, 1909	114	Improved	I	L.	7	Favorable	Unimpaired	90-100	98.8	......	....	....

The four non-tuberculous cases are not included in this report.

SUMMARY.

CLASS II. PATIENTS WHO REMAINED THREE MONTHS OR MORE.

CLASS.	Extent of Physical Signs.	T. B. Found at any Time.	PATIENTS WHO STAYED OVER NINETY DAYS.					
			Cases.	Apparently Cured.	Arrested.	Improv'd.	Progressive.	Died.
			No. %	No. %	No. %	No. %	No. %	
Incipient,	I	o	10=14	7=70	3= 30	......	....	...
Incipient,	I	+	2= 3	....	2=100	......	....	...
Moderately advanced,	I	o	3= 5	....	2= 67	1=33	....	...
Moderately advanced,	I	+	7=11	1=14	3= 43	3=43	....	...
Moderately advanced,	II	o	2= 3	....	1= 50	......	1=50	...
Moderately advanced,	II	+	38=52	2= 5	14= 37	7=18	15=40	...
Moderately advanced,	III	+	1= 2	....	1=100	......	....	...
Far advanced,	III	+	7=10	....	1= 14	1=14	5=72	...
Total,	....	....	70	10=14	27=38	12=18	21=30	...

MONTHLY ADMISSIONS, DISCHARGES AND AVERAGES FOR THE YEAR 1908–1909.

Month.	Admissions.	Discharges.	Daily Average for Month.
October,	3	6	48.7
November,	10	9	48.8
December,	3	0	49.8
January,	4	6	51.3
February,	9	9	49.1
March,	7	9	47.7
April,	13	13	48.0
May,	14	14	48.0
June,	14	12	48.2
July,	10	10	49.6
August,	10	7	49.7
September,	9	16	49.4
Total,	106	111	49.03

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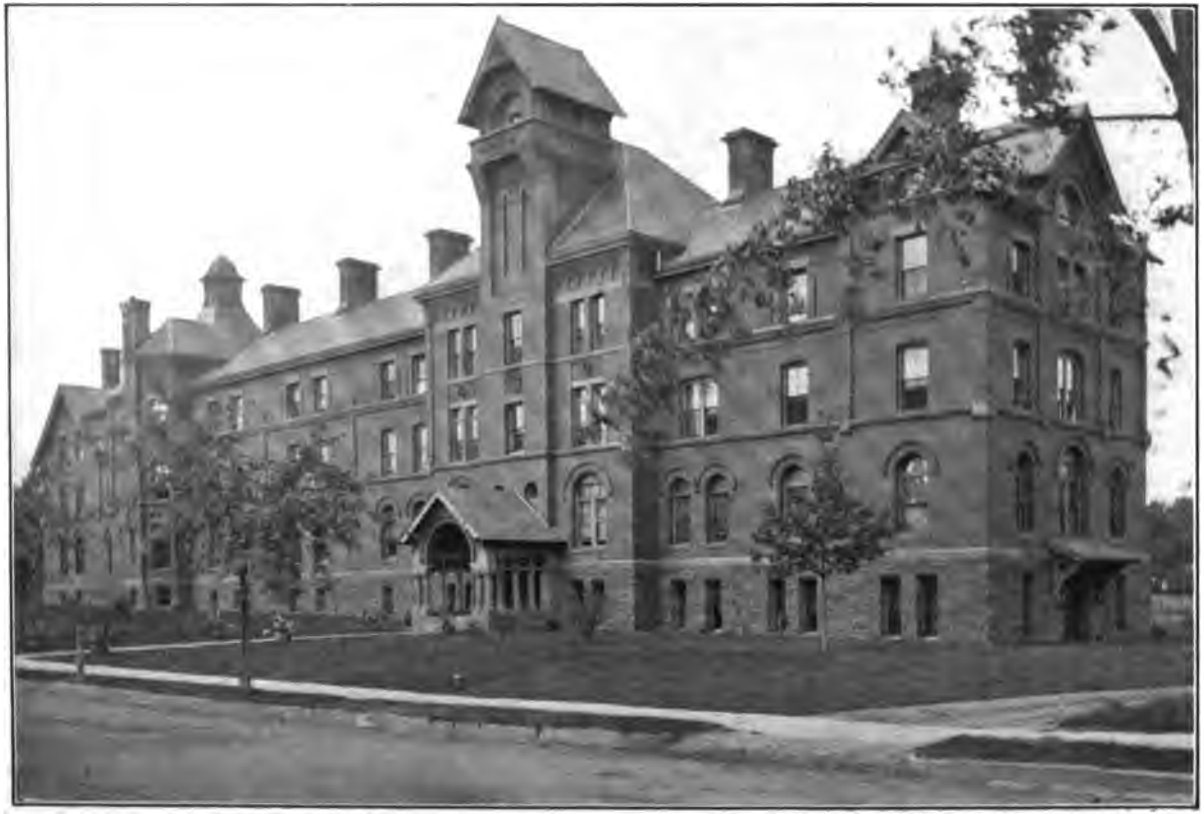

OLD PEOPLE'S HOME.

OLD PEOPLE'S HOME

EXECUTIVE COMMITTEE AND OFFICERS IN CHARGE OF THE OLD PEOPLE'S HOME

Executive Committee.

WILLIAM D. MORGAN, M.D., *Chairman*, 49 Pearl St.
LOUIS R. CHENEY, 36 Pearl St.
PHINEAS H. INGALLS, M.D., 49 Pearl St.
GILBERT F. HEUBLEIN, 74 Trumbull St.
GEORGE C. F. WILLIAMS, M.D., 990 Prospect Ave.
FRANCIS R. COOLEY, 49 Pearl St.

Superintendent.

APPLETON W. SMITH, M.D.

Visiting Physician.

JOHN B. WATERS, M.D.

Matron.

MRS. ELIZABETH J. FOX.

Assistant.

MISS CARRIE M. FOX.

TREASURER'S REPORT

OLD PEOPLE'S HOME.

Close of Fiscal Year, September 30, 1909.

RECEIPTS.

Balance cash from 1908 report, including unexpended income, account trust funds, . .	$2,623.91
Donation of Brown, Thomson & Co., Hartford,	10.00
Bequest in will of Helen M. King, Suffield, with additions, ...	2,002.70
One-half net income from Wildwood Farm (H. H. received one-half), ...	439.82
Interest, General Fund, ...	6,685.62
Permanent Funds, ...	2,749.14
Keney Fund Income, ...	2,098.14
The William R. Morgan Trust Income, . .	1,821.27
From Superintendent for board of inmates and from all other sources at O. P. Home, net,	5,114.69
Permanent Inmate Fees, ...	4,000.00
Savings Banks, drawn and paid to inmates, .	153.00
Fund Account No. 2, from deceased inmates, .	620.22
Inmates' Accounts to new year, ...	3,874.49
	$32,193.00

DISBURSEMENTS.

Balance of Inmates' Accounts from 1908 report,		$3,665.48
Paid for supplies, repairs, salaries, pay-rolls, etc., at O. P. Home, ...		18,879.99
Insurance on buildings and contents for term policies, so that one-third of insurance will expire annually, ...		250.00
Savings Banks, deposited on account of various inmates, ...		506.52
The William R. Morgan Trust Income, paid for care of inmates in O. P. Home under trust created by William R. Morgan, . . .		1,825.00
Expense: Proportion of cost of annual reports and envelopes, ...	$169.99	
Auditing accounts, ...	7.50	
Printing vouchers, checks and orders,	27.50	
Salary of Treasurer, one year, . .	300.00	
Incidentals, ...	1.65—	506,64
Balance Cash:		
The William R. Morgan Trust Income, . .	$258.79	
O. P. Home for general use, ...	6,300.58—	6,559.37
		$32,193.00

WARD W. JACOBS, *Treasurer.*

OLD PEOPLE'S HOME.

CLOSE OF FISCAL YEAR, SEPTEMBER 30, 1909.

RESOURCES.

GENERAL FUND

BONDS

	Book Value.	Market Value.
Baltimore & Ohio R. R., So. Western Div., 3½s, July 1, 1925 (par $20,000), . . .	$17,550.00	$18,000.00
Chicago, Peoria & St. Louis Ry., Prior Lien, 4½s, March 1, 1930, ...	20,000.00	17,000.00
Hartford & Conn. Western R. R., 4½s, July 1, 1923, ...	10,000.00	10,100.00
Missouri, Kansas & Eastern Ry., 5s, April 1, 1942, ...	6,000.00	6,900.00
Missouri Pacific Ry., Coll. Trust, 5s, Jan. 1, 1917,	25,000.00	25,250.00
Adams Express Co., Coll. Trust, 4s, Mar. 1, 1948,	500.00	460.00
Adams Express Co., Coll. Trust, 4s, June 1, 1947, (par $22,000), ...	22,200.00	20,460.00

BANK STOCKS

Shares.			
10	Farmers & Mechanics Nat., Hartford, .	1,000.00	1,120.00
7	Fairfield County Nat., Norwalk, . .	700.00	735.00

RAILROAD STOCK

10	St. Johnsbury & Lake Champlain (par $500),	1.00	1.00

MANUFACTURING STOCK

100	Farnham Typesetter Mfg. Co. (par $2,500),	1.00	1.00

EXPRESS STOCKS

109	Adams Express Company, . . .	10,900.00	24,525.00
25	Wells, Fargo & Company, . . .	2,500.00	7,750.00

REAL ESTATE

Buildings and grounds, ...	1.00	1.00
One-half interest in "Wildwood Farm," . .	1.00	1.00
Land in Florida (from permanent inmate), .	1.00	1.00

Inmates' Trust Accounts

	Book Value.	Market Value.
Savings Bank Deposits, ...	2,738.48	2,738.48

TRUST FUNDS

Elizabeth C. Bacon Fund

Income for support of inmate in O. P. Home as designated.

BONDS

Lehigh Valley Ry. of N. Y., 4½s, July 1, 1940,	6,000.00	6,480.00

Mary Jane Blackman Fund

BONDS

Missouri, Kansas & Eastern Ry., 5s, April 1, 1942, ...	3,000.00	3,450.00
Savings Bank Deposits, received as part of distribution of estate, ...	25,692.53	25,692.53

F. A. Brown Fund

Income for general purposes.

BONDS

Lehigh Valley Ry. of N. Y., 4½s, July 1, 1940,	5,000.00	5,400.00

Martha W. Brown Fund

Income for general purposes.

BONDS

Lehigh Valley Ry. of N. Y., 4½s, July 1, 1940,	2,000.00	2,160.00

Susan S. Clark Fund

Income for support of inmate in O. P. Home as designated.

BONDS

Lehigh Valley Ry. of N. Y., 4½s, July 1, 1940,	5,000.00	5,400.00

Charles E. Fox Fund

Income for humane purposes.

BONDS

Cleveland, Cincinnati, Chicago & St. Louis Ry. (St. Louis Division, Collateral Trust), 4s, Nov. 1, 1990 (par $4,000), ...	3,665.00	3,840.00
Lehigh Valley Ry. of N. Y., 4½s, July 1, 1940,	5,000.00	5,400.00

SAVINGS BANK DEPOSIT		Book Value.	Market Value.
Mechanics Savings Bank, Hartford, . .		760.00	760.00
Keney Fund			
Income for benevolent purposes.			
BONDS			
Hartford Street Railway, 4s, Sept. 1, 1930, .		25,000.00	25,000.00
New York Dock Company, 4s, Aug. 1, 1951, .		13,500.00	12,825.00
STOCK			
Shares.			
137 New York Dock Company, pref., . .		11,249.00	11,234.00
SAVINGS BANK DEPOSIT			
Mechanics Savings Bank, Hartford, . .		251.00	251.00
William E. Sugden Fund			
Income for general purposes.			
SAVINGS BANK DEPOSIT			
Society for Savings, Hartford, . . .		500.00	500.00
Catherine Tuttle Fund			
Income for benevolent purposes.			
BONDS			
Lehigh Valley Terminal Ry., 5s, Oct. 1, 1941,		2,000.00	2,340.00
William F. Tuttle Fund			
Income for benevolent purposes.			
BONDS			
Lehigh Valley Ry. of N. Y., 4½s, July 1, 1940,		5,000.00	5,400.00
Miscellaneous			
Savings Bank Deposits, ...		12,034.20	12,034.20
Bills Receivable, Real, ...		3,300.00	3,300.00
" " " Special, . . .		575.00	575.00
Balance cash:			
The William R. Morgan Trust Income, ...	$258.79		
O. P. Home, for general use, . .	6,300.58	6,559.37	6,559.37
		$255,179.58	$273,644.58

SUMMARY.

	Book Value	Market Value
General Fund,	$137,427.77	$153,377.77
Elizabeth C. Bacon Fund,	6,000.00	6,480.00
Mary Jane Blackman "	28,692.53	29,142.53
F. A. Brown "	5,000.00	5,400.00
Martha W. Brown "	2,000.00	2,160.00
Susan S. Clark "	5,000.00	5,400.00
Charles E. Fox, "	9,425.00	10,000.00
Keney "	50,000.00	49,310.00
William E. Sugden "	500.00	500.00
Catherine Tuttle "	2,000.00	2,340.00
William F. Tuttle "	5,000.00	5,400.00
Susan C. Robbins, Special	1.00	1.00
The William R. Morgan Trust Income,	258.79	258.79
Inmates' Trust Accounts,	3,874.49	3,874.49
	$255,179.58	$273,644.58

WARD W. JACOBS, *Treasurer.*

STATEMENT FOR FISCAL YEAR ENDED SEPTEMBER 30, 1909.

Received from Superintendent and from all other sources at O. P. Home,		$5,114.69
Income from investments and trust funds,		11,532.90
Permanent Inmate Fees,		4,000.00
One-half net income from Wildwood Farm (H. H. received one-half),		439.82
		$21,087.41
Expenditures at O. P. Home,	$18,879.99	
Insurance on O. P. Home buildings and contents for term policies, so that one-third of insurance will expire annually,	250.00	
Office expenses,	506.64	19,636.63
Gain for the year ended September 30, 1909,		$1,450.78

WARD W. JACOBS, *Treasurer.*

FORM OF BEQUEST.

I give to the Hartford Hospital in the city of Hartford ....dollars, for the uses of the Old People's Home, a department of said Hospital.

FORM OF BEQUEST FOR FREE BED.

I give to the Hartford Hospital in the city of Hartford the sum of five thousand dollars, to be used in the maintenance of a free bed in the Old People's Home, a department of said Hospital.

THE TWENTY-FIFTH ANNUAL REPORT

OF THE

OLD PEOPLE'S HOME.

To the Directors of the Hartford Hospital:

GENTLEMEN: Your Executive Committee herewith presents its Twenty-fifth Annual Report of the Old People's Home for the year terminating September 30, 1909. The details of administration will be found in the Superintendent's report, to which your attention is called.

Respectfully,

WILLIAM D. MORGAN, M.D.,
LOUIS R. CHENEY,
PHINEAS H. INGALLS, M.D.,
GILBERT F. HEUBLEIN,
GEORGE C. F. WILLIAMS,
FRANCIS R. COOLEY.

SUPERINTENDENT'S REPORT

THE TWENTY-FIFTH ANNUAL REPORT

OF THE

OLD PEOPLE'S HOME.

To the Executive Committee of the Hartford Hospital:

GENTLEMEN: I submit herewith for your consideration the Twenty-fifth Annual Report of the Old People's Home for the fiscal year ending September 30, 1909.

On October 1, 1908, there were present in the Home 64 inmates — 55 females and 9 males; of these 56 were permanent inmates and 8 boarders.

During the year 5 patients have died: Mrs. Arethusa Clapp Towner, age 80, entered as a boarder March 14, 1905, died November 3, 1909; Mrs. Elizabeth F. Kippen, age 81, entered February 2, 1908, died January 26, 1909; Miss Anna E. Stone, age 61, entered January 1, 1908, died June 6, 1909; Horatio Noble, age 73, entered January 13, 1908, died June 24, 1909; Mrs. Maria E. Cook, age 92, entered March 22, 1889, died August 21, 1909.

During the year five persons have been admitted, four females and one male. Of these one was a boarder and four were permanent inmates.

On September 30, 1909, there remain in the Home 56 permanent inmates and 9 boarders, making a total of 65 — 56 females and 9 males.

The ages of the permanent inmates are as follows:

Between 60 and 70,	8
Between 70 and 80,	27
Between 80 and 90,	19
Over 90,	2

Five inmates are supported by The William R. Morgan Trust Fund. At the present time we have eight vacant rooms.

The following is a statement of the receipts and disbursements from October 1, 1908, to September 30, 1909.

The following is a statement of the receipts and disbursements from October 1, 1908, to September 30, 1909.

RECEIPTS.

Boarders,	$2,505.00
Received from rent of rooms,	104.00
" " sales,	20.00
Total,	$2,629.00

DISBURSEMENTS.

Salaries and wages,	$6,197.95
Medical supplies,	81.37
Surgical supplies,	5.73
Board and care of patients,	304.00
Burials,	35.00
Housekeeping supplies,	433.49
Kitchen supplies,	48.93
Bread,	499.00
Milk,	1,109.37
Groceries,	973.55
Butter,	1,043.20
Eggs,	270.28
Fruit,	479.49
Vegetables,	745.23
Meat,	3,549.51
Poultry,	115.15
Fish,	282.12
Electric light,	349.94
Fuel, oil and waste,	1,497.39
Water,	219.12
Gas,	24.31
Ice,	159.89
Maintenance, real estate and buildings,	204.58
Maintenance, machinery and tools,	101.22
Plumbing and steam fitting,	51.35
Miscellaneous,	98.58
Total,	$18,879.99

During the past year the ordinary repairs and improvements have been made as they were necessary. The boilers for heating purposes have had their five boxes relined and been furnished with new sets of grates.

The men's dining room and pantry and the pantry connected with the women's dining room have been repainted, as well as several of the inmates' rooms.

Mrs. Elizabeth J. Fox, who has rendered efficient service as matron for these many years, still continues her duties with vigor and fidelity.

Appended to this report is a list of those who have contributed to the comfort and welfare of the inmates. Mrs. Mary S. Munsill and Mr. Gail B. Munsill's continual thoughtfulness add greatly to their pleasure.

Especial mention should be made also of the work which the committee of ladies do who have charge of the annual fair which means so much to the old ladies.

Respectfully submitted,
Appleton W. Smith, M.D.,
Superintendent.

DONATIONS.

Through the kindness of the editors, the Home received the *Hartford Times, Ladies' Home Journal, and Saturday Evening Journal.*

Contributions.

From Mrs. Mary S. Munsill: Oct. 15, 1908, three gallons of oysters, two pounds of butter, one quart of cream, two bags of crackers for supper; Oct. 17, 1908, one barrel of apples; Nov. 14, 1908, one barrel of white grapes; Nov. 19, 1908, one bunch of large bananas; Thanksgiving Day, cranberries for the whole house, one box of large oranges, one barrel of apples; Dec. 24, 1908, three boxes of oranges; Jan. 27, 1909, three boxes of oranges; Feb. 4, 1909, one box of apples and one large bunch of bananas; Feb. 19, 1909, three boxes of oranges; March 9, 1909, three boxes of oranges; March 22, 1909, three boxes of oranges; May 1, 1909, three boxes of oranges; May 25, 1909, half crate of strawberries (all hulled), twenty-five pounds of sugar; June 19, 1909, crate of blackberries, five watermelons; July 3, 1909, five watermelons, twelve dozen crullers; July 5, 1909, ice cream for all; July 9, 1909, crate of raspberries, twenty-five pounds of sugar, box of crackers; July 13, 1909, crate of raspberries; May 3, 1909, crate of breakfast melons; Aug. 7, 1909, crate of red raspberries; Aug. 19, 1909, basket of peaches, crate of pears; Sept. 24, 1909, three baskets of peaches, sugar to go with same, reading matter.

From Miss Pardee: Thanksgiving Day, money; Christmas Day, money.

From Mrs. Judson H. Root: July 3, 1909, five dollars for trolley rides.

Other Gifts.

Mrs. M. S. Munsill, reading matter.

Mrs. J. H. Root, reading matter.

Mrs. Joshua W. Allen, books for the library.

Mrs. Lee, ten pairs of wristlets for the old men.

SERVICES.

Regular services are held in the chapel every Sunday afternoon from October to July by the clergymen of the city. The services are much appreciated by the inmates. Communion service is held once each year by the Rev. Rockwell Harmon Potter. The service is held in the second floor sitting room, affording the only opportunity to many to partake of communion.

The King's Daughters meet at the Home once each month.

ENTERTAINMENTS.

December, 1908, the annual fair was held with great success.

TERMS OF ADMISSION.

Application for admission as permanent inmates to the Old People's Home must be made to the Executive Committee.

The applicant must be a citizen of the State of Connecticut, not less than sixty-five years of age, and furnish a full statement of the circumstances.

All applicants for admission must be examined by the Physician of the Old People's Home who is appointed for that purpose.

When the applicant has been accepted the payment agreed upon must be made to the Treasurer of the Hartford Hospital, together with full title and delivery of all real and personal estate owned.

A probationary period of two months will be required before the applicant can be confirmed as a permanent inmate of the Home; and if from any cause the applicant is not accepted, a reasonable charge for board and care will be made by the Executive Committee.

Every person admitted as permanent inmate must sign and execute in a book kept by the Treasurer for that purpose an agreement and conveyance as stipulated.

No article of furniture shall be brought into the Home without the consent of the Executive Committee; such articles as shall be admitted shall be and become the absolute property of the Hospital.

Form of Agreement: The undersigned having been received as a permanent inmate and beneficiary of the Old People's Home, a department of the Hartford Hospital, in the city of Hartford, now, in consideration of the benefits assured to me as such beneficiary and of my admission thereto, I do hereby assent to and promise compliance with the rules and regulations of such Home, as they exist at the date hereof, and as the same shall be made, amended, or modified thereafter; and I do hereby sell, assign, set over, and convey unto the Directors of the Hartford Hospital, and their successors and assigns forever, all the goods, chattels, effects, and personal property of every kind, and all real estate, wheresoever the same may be situated, which I now possess, or to which I shall hereafter become entitled during my residence at the Home; and I hereby make and appoint the Treasurer of the Hartford Hospital, and his successor and successors in office, my attorney and trustee irrevocable, with full power and authority to demand, receive, collect, and recover said property, effects, and claims, for the purposes hereinbefore and hereinafter stated, to pay and deliver the same to said Home. It is also understood that I may at any time terminate my connection with the Home, and that the Executive Committee of the Hospital may, in their discretion, at any time, require me to do the same. It is, however, understood that, upon payment to said Hospital of such sum or sums of money as fixed by the Executive Committee as a fair compensation for my support, and charges against me to the full extent, and for all the term in which I shall have been an inmate of said Home, then I am to receive from said Hospital such property as I have transferred to it, or the proceeds of such property as the Executive Committee may have disposed of.

HOUSE RULES.

Article I. — Duties of Matron.

The Matron shall have the general care of the domestic affairs of the Home and of the inmates, subject to the direction of the Superintendent and Executive Committee. No person will be permitted to interfere or find fault with the Matron; but if any inmate has cause for complaint, application must be made to the Executive Committee, who will receive any statement and take action thereon as they think proper. She shall see that all inmates, who are able to do so, shall take their meals at the family table, and that proper order is preserved; also, that suitable food shall be provided for the sick.

Article II. — Duties of Inmates.

Any inmate wishing to leave the house to visit friends or otherwise must apply to the Matron for her assent, stating where he or she intends going, and when he or she expects to return. Every inmate who is able to do so will be required to keep his or her room neat and clean, and the furniture in order, and to make themselves generally useful. Any inmate who shall be guilty of circulating reports injurious to the reputation of the Home, criticising or finding fault with the management, creating dissatisfaction or disturbance among its inmates, shall be admonished, and on repetition of such offense shall hereby forfeit his or her privileges, and be dismissed from the institution. It shall not be allowable for the male or female inmates to visit each other's rooms, but they may meet in the corridors, which will always be open to them.

Article III. — Visitors.

The friends of inmates, and the public generally, may visit the Home on Thursday, between the hours of 10 and 12 o'clock A. M., and from 2 to 4 o'clock P. M. At other times visitors will be admitted only by permission of the Superintendent or Matron.

ARTICLE IV. — PHYSICIANS.

No physician except those connected with the Hospital will be allowed to attend the inmates, except by permission of the Chairman or some member of the Executive Committee.

ARTICLE V.

No spirituous liquors shall be brought into the Home, nor shall any be used by any inmate, unless the same be prescribed by the attending physician, and placed in charge of and administered by the Matron.

ARTICLE VI.

The lights shall be extinguished in the rooms of the inmates at nine in the evening, and in the halls and corridors at 10 P. M., unless the Matron, for good reasons, directs otherwise.

ARTICLE VII.

Upon the death of an inmate, the Matron shall immediately notify the Executive Committee, and also the friends, as far as their address may be ascertained. Should the funeral take place from the Home, the arrangements shall be uniform in all cases, and shall be made under the direction of the Executive Committee. The friends of the deceased may defray the expenses, or remove the remains elsewhere for interment by permission of the Superintendent.

ARTICLE VIII.

Willful violation of any of these rules or regulations by any of the inmates shall render such person liable to dismissal, in which case he or she shall not be entitled to a return of any moneys paid by such individual; such clothing or other personal effects belonging to the person dismissed may be taken. The Executive Committee may make such dismissal. Persons expelled will not be permitted to visit the Home under any circumstances. In all matters of difference between the inmates the decision of the Superintendent shall be conclusive, until modified or reversed by the Executive Committee. The orders of the Superintendent and Matron, in all matters relating to the domestic government of the family, must be observed by all inmates; such orders must be reported to the Executive Committee.

State of Connecticut

PUBLIC DOCUMENT No. 18

FORTY-SECOND ANNUAL REPORT

OF THE

SECRETARY

OF THE

Connecticut Board of Agriculture

1909

PRINTED BY ORDER OF THE LEGISLATURE

HARTFORD
PUBLISHED BY THE STATE
1910

12

Publication

Approved by

The Board of Control.

PRESS OF THE CASE, LOCKWOOD & BRAINARD COMPANY.

HIS EXCELLENCY

FRANK B. WEEKS,

Governor of Connecticut.

Sir: —

In accordance with the provisions of an act creating the State Board of Agriculture, I have the honor to submit herewith the Report for the year ending December 31, 1909.

Very truly yours,

IVERSON C. FANTON,

Secretary.

WESTPORT, Dec. 31, 1909.

STATE BOARD OF AGRICULTURE.

1909.

His Excellency FRANK B. WEEKS, *ex officio*.

MEMBERS APPOINTED BY THE GOVERNOR AND SENATE.

		Term expires
Wilson H. Lee,	Orange,	July 1, 1911
Iverson C. Fanton,	Weston,	July 1, 1911
George A. Cosgrove,	Willington,	July 1, 1913
Leonard H. Healey,	North Woodstock,	July 1, 1913

APPOINTED BY THE GENERAL ASSEMBLY.

Hartford County,	N. Howard Brewer, Hockanum,	1913
New Haven County,	D. Walter Patten, North Haven,	1913
New London County,	James B. Palmer, Norwich,	1913
Fairfield County,	George A. Barnes, Sherman,	1913
Windham County,	Everett E. Brown, Pomfret,	1911
Litchfield County,	Burton C. Patterson, Torrington,	1911
Middlesex County,	Wilbur L. Davis, Durham,	1911
Tolland County,	Chas. A. Thompson, Melrose,	1911

OFFICERS OF THE BOARD.

Governor Frank B. Weeks, *President ex officio*.

Wilson H. Lee,	Orange,	*Vice-President.*
I. C. Fanton,	Westport,	*Secretary.*
Chas. A. Thompson,	Melrose,	*Treasurer.*
Dr. E. H. Jenkins,	New Haven,	*Chemist.*
Dr. G. P. Clinton,	New Haven,	*Botanist.*
Dr. W. E. Britton,	New Haven,	*Entomologist.*
N. S. Platt,	New Haven,	*Pomologist.*

Auditors.

James B. Palmer, D. Walter Patten, Geo. A. Barnes.

State of Connecticut.

BOARD OF AGRICULTURE.

WHEREAS: Col. James F. Brown of North Stonington has been connected with the State Board of Agriculture since 1895, with the exception of two years, and as he showed himself in the services of his Country in the Civil War to be a leader of men, a man of exceptional ability and judgment, in like manner as a Member of this Board, and since 1901 as its Secretary, he has shown himself to be a man among men, whose efficiency has been unquestioned, a gentleman in any capacity he has ever been placed. Therefore be it

Resolved: That we highly appreciate his services, both as a Member of the Board and as its Secretary also. The dignity and gentlemanly bearing with which he has always conducted his part of the work. Our associations together have been so pleasant and peaceful, we can hardly realize that they are about to end, but we trust peace and prosperity may attend Col. Brown during his remaining years, which we hope and trust will be many, and that they will be filled with that honor and respect which is but the fruitage of a life well spent.

Resolved: That Col. and Mrs. Brown are cordially invited to meet with the Board as our guests at our next Mid-Winter Meeting.

Resolved: That a copy of these resolutions be spread upon our Record book and also sent to Col. Brown.

The above resolutions were unanimously adopted by the Board, July 1, 1909.

IVERSON C. FANTON,
Secretary.

State of Connecticut.

BOARD OF AGRICULTURE.

WHEREAS: Mr. Seaman Mead of Greenwich and Mr. Edmund Halladay of Suffield have been Members of this Board for the past twelve years, and Mr. Charles L. Tuttle of Hartford for the past ten years, and

WHEREAS: They each retire from the Board this day by their own volition; having faithfully served the Board and through the Board, the State of Connecticut during all these years, without receiving one penny of compensation, either directly or indirectly. Therefore be it

Resolved: That we, the State Board of Agriculture, now in session in Annual Meeting, on this the first day of July, 1909, do hereby express our hearty appreciation of the valuable service they have rendered. Having been leaders in thought and the advancement of agricultural interests, always willing and anxious to do their part in any and all duties assigned them. Be it further

Resolved: That we regret that we are, from this time on, deprived of their valuable counsel and good judgment, but rejoice that we have very many pleasant memories of their association with us. Be it further

Resolved: That a cordial invitation be extended to the above-named gentlemen to meet with us as guests of the Board at our next Mid-Winter Meeting.

Resolved: That a copy of these resolutions be spread upon our Record book and also one sent to each of the above-named gentlemen.

The above resolutions were unanimously adopted by the Board, July 1, 1909.

IVERSON C. FANTON,
Secretary.

INSTITUTES.

During the past years, institutes in Connecticut have been held by the different State Associations, and by the Board of Agriculture, each acting in a measure independent of the other; each paying the expenses of the institute conducted under its supervision, from the funds appropriated by the State. The manner of conducting institutes in Connecticut has been a matter of considerable thought and study by those having the best interests of the State at heart, and naturally there are many differences of opinion. A large majority, we believe, think the work should be systematized, so as to avoid any conflicting in dates or speakers and also to avoid the expense of speakers traveling from one side of the State to the other.

In order to bring about the desired results, an Advisory Board of Institute Work was formed, consisting of the secretaries of the different State Associations. In November, 1909, this Advisory Board was reorganized, with I. C. Fanton, Secretary of the State Board of Agriculture, as Chairman, Harrison L. Hamilton, Secretary of the Connecticut Poultry Association, as Secretary, and Burton C. Patterson, Secretary of the State Sheep Breeders' Association, as Treasurer.

The plan, as formulated by the Advisory Board, was to get all the applications for institutes in, on or before a certain date; then to confer together and lay out a systematic plan of work, assigning to each association the work it could take care of to the best advantage, considering its available finances and the topics asked for.

Accordingly the following circular letter was sent to the master and lecturer of every subordinate Grange in the State:

Worthy Patrons:

The dissemination of knowledge of better methods of farm practices and management through the medium of farmers' institutes is admitted by all to be a most excellent form of educational work. The Grange is the principal medium through which we have reached the people in the past and for that reason we are seeking your co-operation at the present time.

We have a limited amount of funds at our disposal which we propose to use in securing the best speakers obtainable upon the following subjects: Fruit Growing, Dairying, Poultry Raising, Forestry, Bee Keeping, Sheep Breeding and Home Improvement. We would recommend the all-day institute with a social hour at noon, which in many cases is as profitable as any part of the program, but where this is not practicable, we will gladly hold an evening institute, furnish one or more speakers upon any subject desired. The meeting to be open to the public, the Grange to entertain the speaker and transport him from and to the railroad station.

Will you kindly co-operate with us to the extent of bringing this matter before your Grange at your next meeting, decide upon the kind of institute you prefer and notify at your earliest convenience either of the above named members of the Advisory Board. Provisional lists of topics and speakers are on file with each member of the Advisory Board, copies of which may be obtained upon request.

Fraternally yours,

I. C. FANTON,

Chairman.

In response to the foregoing circular letter, thirty-four applications have been received, and provisions are being made to supply each of these applications with speakers upon the topics specified, and in as systematic a manner as possible, under existing conditions.

The plan as heretofore outlined is not perfect as yet, but we believe something has been accomplished, and that we shall eventually see the work thoroughly systematized.

AGRICULTURAL CONVENTION AT NEW HAVEN.

The Annual Midwinter Meeting of the Board of Agriculture was held in Harmonie Hall, New Haven, December 7, 8 and 9, 1909.

PROGRAMME

Tuesday, December 7th.

10.45 A. M. MUSIC.

11.00 A. M. INVOCATION. *By Rev. Watson L. Phillips, D.D.*
ADDRESS OF WELCOME.
By His Honor James B. Martin,
Mayor of New Haven.
RESPONSE.
By His Excellency Frank B. Weeks,
Governor of Connecticut.

11.30 A. M. ADDRESS. *By Prof. Arthur T. Hadley,*
President of Yale University.

11.45 A. M. ADDRESS. *By Prof. C. L. Beach,*
President of Conn. Agricultural College.

RECESS.

1.45 P. M. MUSIC.

2.00 P. M. ADDRESS—"Incubation."
By Mr. Charles F. Stephenson,
Storrs, Conn.

2.45 P. M. ADDRESS—"A Woman's Success in Poultry Culture."
By Mrs. Mollie McC. Allen,
Oswego, N. Y.

3.30. P. M. CHALK TALK.
By Mr. W. H. Card,
Manchester, Conn.

RECESS.

7.15 P. M. MUSIC.

G.CJ P. M. ADDRESS—"Further Investigation of White Diarrhea in Chicks."
By Dr. L. P. Rettger,
Sheffield Scientific School, New Haven.
And by Prof. F. H. Stoneburn,
Conn. Agricultural College.

8.30 P. M. ADDRESS—"Game Birds under Domestication."
By Dr. C. F. Hodge,
Clark University, Worcester, Mass.
(Illustrated with large collection of lantern slides.)

Wednesday, December 8th.

9.45 A. M. MUSIC.

10.00 A. M. ADDRESS —"Re-establishment of Sheep Husbandry in Connecticut."
By Prof. R. L. Gribben,
Professor of Animal Husbandry, Mass. Agricultural College.

10.45 A. M. ADDRESS —"The Importance of Sheep Husbandry in New England."
By Hon. Frank Gerrett,
Greenfield, Mass.

11.45 A. M. "A Review of the Present Dog Laws of Connecticut."
By Mr. F. H. Stadtmeuller,
Elmwood, Conn.

RECESS.

1.45 P. M. MUSIC.

2.00 P. M. ADDRESS —"Corn in New England."
By Prof. J. A. Ford,
Amherst, Mass.

3.00 P. M. ADDRESS —"Corn Growing, Seed Selection, Planting and Cultivating."
By Col. J. B. Walker,
Hopkinsville, Ky.

RECESS.

7.15 P. M. MUSIC.

7.30 P. M. ADDRESS —"Alfalfa and Clover Growing."
By Col. J. B. Walker,

8.15 P. M. ADDRESS —"Alfalfa Growing in Connecticut."
By Col. Charles M. Jarvis,
Berlin, Conn.

9.00 P. M. ADDRESS —"Dairying in Europe vs. Connecticut."
By Vice-President Wilson H. Lee,
Orange, Conn.

Thursday, December 9th.

9.45 A. M. MUSIC.

10.00 A. M. ADDRESS —"Animal Husbandry."
By Prof. H. H. Wing,
Cornell University, Ithaca, N. Y.

11.00 A. M. ADDRESS —"The Nitrogen Problem in the Dairy."
By Prof. William D. Hurd,
Amherst, Mass.

RECESS.

1.45 P. M. MUSIC.

2.00 P. M. ADDRESS —"Best Methods of Improving the Dairy Cow."
By Prof. J. M. Truman,
Conn. Agricultural College, Storrs. Conn.

3.00 P. M. ADDRESS —"Every Farmer His Own Corn Breeder."
By Dr. E. H. Jenkins,
Agricultural Experiment Station, New Haven.

Premiums.

The Board offers the following premiums for the best exhibit of Corn by individual growers in the State:

CLASS A.—DENT CORN.

	1st	2d	3d
Division 1 — 10 ears early yellow,	$5	$3	$2
" 2 — 10 ears late yellow,	5	3	2
" 3 — 10 ears early other than yellow,	5	3	2
" 4 — 10 ears late other than yellow,	5	3	2

CLASS B.—FLINT CORN.

	1st	2d	3d
Division 1 — 10 ears early yellow,	$5	$3	$2
" 2 — 10 ears late yellow,	5	3	2
" 3 — 10 ears early other than yellow,	5	3	2
" 4 — 10 ears late other than yellow,	5	3	2

CLASS C.— 10 ears early Sweet Corn............1st, $5; 2d, $3; 3d, $2.
CLASS D.— 10 ears late Sweet Corn.............1st, $5; 2d, $3; 3d, $2.
CLASS E.— 10 ears Pop Corn..................1st, $5; 2d, $3; 3d, $2.

CLASS F.		*CLASS G.*	
Best ear of Dent Corn,	$2.50	Best ear of Flint Corn,	$2.50

The Connecticut Sheep Breeders' Association offers the following prizes upon wool to be exhibited at this meeting December 8, 1909

Class I.	Fine Wool,	Best fleece, $5.00;	2d Best fleece, $3.00
Class II.	Medium Wool,	Best fleece, 5.00;	2d Best fleece, 3.00
Class III.	Coarse Wool,	Best fleece, 5.00;	2d Best fleece, 3.00
Class IV.	Combing Wool,	Best fleece, 5.00;	2d Best fleece, 3.00

Special prizes will be awarded for the two fleeces put up in the neatest and most attractive form for market.

First prize, ...	$5.00
Second prize, ...	3.00

Competitors must be members of the Connecticut Sheep Breeders' Association, and must be owners of the sheep from which the fleece shall have been taken; all fleeces to be selected only from sheep kept in the State. The inspection of exhibits and awards are to be made by wool experts.

The meetings will be open to all interested in agriculture, and it is hoped that all will come prepared to participate in the discussion of important subjects that will be considered.

A Committee of the Board will render such assistance as may be required to all in attendance.

A special invitation is extended to the ladies to be present.

RULES GOVERNING APPLICATION OF SPECIAL REDUCED FARES BETWEEN LOCAL STATIONS ON CERTIFICATE PLAN.

The fare for the round trip in connection with certificates will be on the basis of full fare going and three-fifths fare returning, but this will not apply from stations where the round trip fare will figure less than twenty-five cents, nor for children traveling on half tickets, and there must be one hundred or more orders deposited with the ticket agent at the place of meeting, as it is absolutely necessary under this arrangement that the minimum number of one hundred be deposited in order to get the reduction on the return trip.

Tickets should be purchased for the going trip and application made to the ticket agent at the initial point for certificate which agent will issue in connection therewith (application must be made sufficiently in advance of train time to enable agent to issue same), and this certificate must be deposited immediately upon arrival with the station ticket agent at the place where the meeting is held.

The ticket agent at the point of the meeting will, when the order is deposited with him, detach the passenger's identification stub and return to the passenger, which it will be necessary to have countersigned by your Secretary.

The ticket agent at the point where the meeting is held will issue tickets for the return journey to the original purchaser (as tickets at these fares are non-transferable) at three-fifths the regular one-way fare (sufficient being added to make return fare end in 0 or 5), provided there are one hundred orders deposited with him and that the identification stub presented by passenger has been properly countersigned.

The headquarters of the Board will be at the Tontine Hotel.

WILSON H. LEE,
D. WALTER PATTEN,
I. C. FANTON,
Committee.

HARTFORD, November 16, 1909.

PROCEEDINGS.

PROCEEDINGS

OF THE

ANNUAL MID-WINTER MEETING

OF THE

Connecticut Board of Agriculture

At Harmonie Hall, New Haven, Conn.,

DECEMBER 7-8-9, 1909.

FIRST DAY — MORNING SESSION.

Music.

Meeting called to order at 11 o'clock, with His Excellency, Governor Frank B. Weeks, President of the Board, in the chair.

The PRESIDENT. Ladies and Gentlemen: It is now 11 o'clock. There will be some of the speakers who are in a hurry to get away, and I am going to ask you to come to order, and without further opening remarks on my part, I am going to ask the Rev. Dr. Phillips of New Haven to give us an invocation.

Dr. WATSON L. PHILLIPS. Let us all pray. O God, our Father, we come to Thee to offer our adoration and our praise. Thou hast given us all life and the ways of all good. Thou sendest the early and the latter rain that there may be fruition of the seed in the soil and bread for the eater. It is Thy blessing upon field and vineyard and flock that causeth their increase. Thou art back of all things that cheer us, and comfort us, and strengthen us, and we offer Thee devoutest praise for Thy goodness, which has been without fail from everlasting to everlasting. We thank Thee for our broad acres, our forests, and our mines. We thank Thee for the prosperity which has attended us and the rich results that have followed the labors which have been acknowledged of Thee; but most of all we thank Thee for those qualities in our people which have given these material possessions their larger value, for the honesty and integrity, for the disposition to fear God and love each other which has characterized our citizens, and which has made itself manifest in all their doings and all their relations. We thank Thee for the principles our *fathers* have established here and committed to their sons as their most sacred legacy, and we beseech Thee in these days of our great prosperity, when the blessing of God has made us rich, that we may not forget these principles and precepts of our fathers, but may continue to be a God-fearing, honest, upright people, who shall acknowledge Thee in all their ways. And now, our Father, we ask that blessing upon us and all our kindred. We pray that Thou wilt bless those in authority over us, the President of these United States, and all bearing with him the responsibilities of the general government; the Governor of this State, and all the interests of this old commonwealth; the mayor of our city, and all the men who are interested with him in working out our municipal problems; and we pray that everywhere among the states and the communities of this nation there may appear those results of our trust in Thee and our efforts to serve Thee which shall gladden our hearts. Let thy blessing also be upon this organization which calls us together, and upon all organizations of men that are working for the uplifting of the people and the bettering of our conditions. Grant unto us, we beseech Thee, that we may be that happy people whose God is the Lord, and that we may reap the rich rewards which are promised to them that walk in Thy fear and in the love of their fellow-men; and not unto us, O God of our fathers, and our God, but unto Thy name shall be the glory forever. Amen.

The PRESIDENT. Now, ladies and gentlemen, since coming to this hall and looking over the program, I have been somewhat surprised to see the list of speakers and the length of the program. I had no idea, although I am President of the Society, that such a program was to be given to the people interested in these subjects today. An official, if he does his duty, is a busy man, and when I see the name of Mayor Martin, knowing what he has on his hands, and of Dr. Hadley of Yale, knowing what he has upon his hands, I think the Connecticut Agricultural Society is to be congratulated that those gentlemen will give us this hour, the busiest hour of the day, to come here to speak to us, and I know that I echo the voice of everyone present when I say that it will give us great pleasure, and I take great pleasure in presenting the mayor of the city of New Haven, Mayor Martin.

Mayor JAMES B. MARTIN of New Haven. Mr. Chairman, Ladies and Gentlemen: Notwithstanding the kind and flattering words of the Governor, I must differ from him in opinion when I say that mine is the pleasure this morning of being present at this annual mid-winter meeting of your Board; and I regard it as an honor and a compliment to take even a small part in the opening exercises of such a convention as this; for I can assure you in all sincerity that I appreciate as a high privilege the opportunity I enjoy this morning of once more meeting His Excellency the Governor, and of meeting members of the State Board of Agriculture, and meeting so many influential, worthy and representative citizens of Connecticut without distinction of sex as I see before me now. I know, Mr. Chairman, that you, collectively and individually, have all done much, achieved much, accomplished much for the good and the welfare and the prosperity of this our commonwealth, and I also realize that you are gathered together this morning here in this beautiful City of Elms, not for any selfish ends or purely social enjoyments, but for the same laudable purpose and the same worthy mission of doing what in your power lies to advance and promote the primal and still important industry of agriculture. And so I can say truthfully that I find it a great pleasure to offer you on behalf of the people of New Haven a most hearty, sincere and hospitable greeting.

Although New Haven is hardly to be classed as an agricultural community, and I, as a native son, can scarcely claim very much consideration or authority for my views or opinions upon farming matters, or upon farm products, except in so far as the latter have been prepared for the market or for the table, nevertheless I am not lacking in appreciation of the importance of the interests which you represent and are serving, nor of the value of the work that is being carried on under the direction of the State Board of Agriculture, nor of the great and practical good that comes out of such meetings as this with which you are now favoring our city.

From your program I see that there are a number and a variety of important subjects to be considered and discussed, and I know that during your sessions you will hear many interesting, eloquent and profitable addresses by able speakers and well informed authorities, and so I would not presume at this, the outset of your convention, with any platitudes of my own upon the science of agriculture, its status or its requirements, or attempt to throw out to you any second-hand suggestions as to its development and encouragement. Rather, I will content myself with sticking to the duty assigned me, of addressing a few brief but sincere words of welcome, and I again express to you the gratification of the people of New Haven at your coming. We feel proud and glad at having our city made the abiding place of such a convention as this. Our public buildings, our institutions, our parks and all our attractions are at your disposal, and invite your inspection during the leisure of your stay. I am glad personally that you are to be among us for a few days, and I trust that your stay will be as pleasant as I know it will be profitable to you.

Once more, Mr. Chairman and members of the Board, friends, I bid you a hearty welcome to our city. (Applause.)

Governor WEEKS. Mayor Martin, on behalf of the Connecticut Board of Agriculture, assembled here in convention, and on behalf of the ladies and gentlemen here present, I thank you for the hearty welcome you offer us as mayor of the city of New Haven. It is indeed appreciated, sir, and we accept it in the same hearty spirit in which it is given. There is no doubt in my mind but what the sessions will not only be profitable to the State, but that our stay in the Elm City will be most enjoyable.

Ladies and gentlemen, when I received my notice of this meeting it seemed to me almost impossible that I could be here. Up even to yesterday noon that was the situation, but I did wish to come and show my interest in the matter which brings your body here today — in agriculture. I am very sorry, and I dislike very much to make an apology, but it seems to me due to you for me to say that an engagement that calls me out of the State will make it impossible for me to stay longer than a little past noon, but since looking over the program I want you to believe it when I say that I know that you are going to have a mighty pleasant entertainment.

Now I do not want you to think that I am going to talk long because I have a few notes in my hand. I could speak, and perhaps say what would satisfy me but not you, but there are a few thoughts in my mind that I want to speak upon, and as I wanted to present them intelligently I have put them down. I am going to give them to you from this little memorandum I have made. I was very much amused in coming down on the train this morning to pick up a New Haven paper — perhaps some of you have seen it. It starts off like this: "If you are not a farmer and want to be one, or if you are a farmer and want to be a better one, go to Harmonie Hall tomorrow, Wednesday and Thursday."

Now from the program I think those who want to be farmers can learn enough to start off intelligently, and those who want to be better farmers will go away with the idea that they have learned something by attending this convention today. Now I am not a farmer, nor am I the son of a farmer, and have only a superficial knowledge of the art of agriculture, but I can assure you that I am interested, and wish to know more of the mysteries of this most wholesome of professions. I have remarked several times this year that I believe that it is highly beneficial for any industry to come together and discuss matters that are of vital importance to that industry, and of agriculture more than any other, for it is an individual occupation. Agricultural matters are now receiving more attention than at any time, if I am informed correctly, within the past forty years, and it is well that it should be so, for while the population of the United States has increased from the usual conditions at home and from immigration, the cultivated area has decreased and thousands of acres formerly raising products have gone to pasture and have gone to waste. I do not think that I put that any too strong. I have ridden over this State considerably in the last year or two, and I think that I will stand by that statement. It looks as if our country would have to stop exporting corn and meat, and every state, I say every state, will soon have to raise to a much greater extent its own fodder and its own meat.

The conservation movement is receiving a great deal of attention throughout the country, and I may say in passing that I shall leave here at noon to attend the Conservation Convention or, more particularly, the Waterways Convention, to be held in

Washington tomorrow and succeeding days. There will undoubtedly be some five hundred delegates present. The President will start the discussion. They will have three days for discussing this matter of national waterways and they may, before they get through, touch upon the matter of the conservation of the soil and of the preservation of our watersheds. The conservation movement has received a great deal of attention — conservation of our watersheds, our waterways, our forests and our soil, and this subject will receive more attention probably during the next few years than 'most any other that could be brought to the attention of the American people. Our agricultural societies should inform themselves fully upon these great subjects, for the waterway and the forest question has very much to do with the soil. In our country's history we have passed the milestone of selfishness. We are going forward to build and conserve our resources which were given to our fathers that they may be preserved undiminished and improved for those who shall follow us. We look to our agricultural societies to use every means within their power to accomplish this. Conservation does not mean to stop using, but wise use, looking toward the need of each generation. Minerals and phosphates are destroyed by use, and timber and soil, by proper care and treatment, can be continued. Our farmers must realize how much the happiness and prosperity of future generations depend upon them in preserving and enlarging the possibilities of the soil. Last night I was looking over my papers, the daily papers, and I saw some surprising farm figures. I instantly clipped them out, and I am going to give them to you. Those of you who have heard them can well afford to hear them again, and those who have not heard them will be surprised to hear them, I think. One hundred and sixty million acres, or one-eighth of the farm land of the United States, have been mapped out and the soil analyzed. This work has disclosed 700 different types of soil, and will eventually include many hundreds more. There are 6,000,000 farms in the United States and 30,000,000 of farm people. The Department of Agriculture is spending $8,000,000 annually in experiment in vegetable and animal foods in attempting to improve the quality and keep down the cost of production, all to aid the farmer. Those are surprising figures. I am glad to give them to you.

During the last summer it was my pleasure to speak somewhat to farmers at the agricultural fairs, and I am going to say something now — perhaps you say I have said it before, but it interested me greatly, and that is the reason I am going to say it again. I have been in the western country and have been interested in the growing of alfalfa. Mr. F. D. Coburn, Secretary of the Kansas State Board of Agriculture, has given out some figures showing that in eighteen years alfalfa has been the leading grass crop of his state. It ranks third in aggregate area, corn and wheat only exceeding it. He is of the opinion that it will grow in many parts of the United States. Let me ask this Society, can it be made to grow in Connecticut? Has it had a fair trial? If not, would it not be well to look into the matter, for the crop is certainly the most prolific and profitable of any of the grass crops, and if I do not mistake, I recall the figures where an acre of hay yields about $32; if alfalfa can be grown, it will yield in the neighborhood of sixty to seventy dollars.

Now just one thought more and I am through. It is to have the children who are brought up on the farms trained to love rural life and follow in the footsteps of their fathers — keep the old homes in the family. (Applause.) I thank you for that because it means a great deal to this State. There has been a large increase of city population at the expense of the country communities. A large proportion of the farm boys who think that city life has the best advantage make a very great mistake. As I have said before, and I repeat it here today, the land is the foundation of the state in every sense of the word, and a sturdy independence of character is the land's best product. I thank you. (Applause.)

Vice-President WILSON H. LEE. Mr. Chairman, Dr. Hadley has not arrived, I think, and I would suggest that you call upon Dr. Phillips.

Governor WEEKS. Without further introduction than that which he has already received, Dr. Phillips will please take the floor.

Dr. PHILLIPS. Your Excellency and members of the Agricultural Society, for such I suppose it is: I shall not take any time to make apologies, but I had no idea of being called upon to address you this morning. I supposed that my duty in connection with your opening exercises would be done when I had asked God's blessing upon you, but I am very glad to look into your faces. I have the same confession to make as the Governor, that I am not a farmer, nor am I the son of a farmer. I come of a line of preachers, though I believe that some of my father's ancestors, and I am quite sure my mother's ancestors, were farmers. Tracing my mother's family back I find that the first of our name was a farmer in Massachusetts, in the old town of Deerfield, and was one of the people concerned in the Deerfield massacre. So I have some connection with farmers and with the soil.

I realize the significance of the words the Governor has spoken. I do believe that a young man who leaves the farm because he thinks life's conditions are easire in the city makes the mistake of his life. It has been my privilege to travel about New England somewhat, and my heart has been made sore as I have come upon these old decaying farmhouses in so many of the outlying districts. The doors gone, the windows out, the partitions falling, the ceilings sagging, and with every evidence that they who once lived there have either died or departed for some other section of the country and some other employment. I do not know of anything more saddening than to come upon one of those wrecks of past happiness, beautiful and comfortable family life, that stare us in the face on so many of our country roads, and I am one of those Americans who hope that the time will speedily come when the sons of the farmers will see in the continuation of the life of their ancestors the best hope for themselves and the largest opportunity for ministering to the need of the time in which they live.

I should be glad to have one of my sons say to me, "I want to settle in the country and live close to nature, and get what I can out of life through the methods of those who have devoted themselves to the cultivation of the soil and supplying the needs of the people who are less fortunate."

Dr. Hadley has come in, and I know you are waiting to hear him. I will take no more of your time, but thank you for the opportunity of looking into your faces.

Governor WEEKS. The remarks just made by Dr. Phillips touch me upon a subject in which I am very much interested.

And you good people who are agriculturalists, when you get together during these winter evenings in your meetings, or wherever it may be, won't you give that a thought, the keeping of the old home intact — won't you give that a thought, and let the children understand it a little bit?

We have with us this morning another very busy man. I am not going to take much time in introducing him, because that would be superfluous. I think all of you know him. I, for one, am, and I think all ought to be, proud and happy to have such a man who can come in and speak to a gathering like this. I have very great pleasure indeed and honor in presenting Dr. Hadley of Yale.

Dr. ARTHUR T. HADLEY. Ladies and Gentlemen: It is a great pleasure to welcome in New Haven an educational institution of the importance of the State Board of Agriculture. When I say educational institution I say it advisedly. We have broadened our ideas of education in the last thirty years. We have got away from the time when we tried to divide life into sections, and thought that the schooling belonged in one section and practice in another. We now see that the best schools are those which teach the children to do things, and we think that the best practice is the practice which represents an education to the man who is doing the work, an education which does not stop until he has reached either the insane asylum or the grave. A great many people have told of the fruitful ideas of the nineteenth century. I doubt whether among them all there is one more fruitful than this idea, that grown men need to keep on educating themselves, and the organizations in which we meet thus to develop our knowledge of practical work are the most valuable parts of our education. All of these things have a most important bearing in any event, but they have special importance in connection with the political tendencies of the present time. We hear all the time in agriculture, in railroading, in all the different professions, of the difficulty of getting men to take the lead. Formerly, we trained our leaders in shops or offices, or on the farms, where they had to do all-around work in competition with others, and the man who could fight the hardest and come out best in that all-around competition was best. He was the leader. Today we are face to face with an age of specialization. It has not been so marked on the farm as it has been in the shop or in the office, but for the farmer, generally speaking, it is an age of specialization. We do not get to the degree that we did fifty years ago the all-around training, we do not get the general right to decide which is the best man that the voters must follow. How shall we decide it? We can only decide it by the intimate exchange of ideas. We can decide it by societies and associations like this, where each man shows to the others the results of his thinking, and in keen discussion it appears which man thinks straightest, has the most practical suggestions, and, in short, is the safest guide to follow.

Now, of course, this is not the same thing as competition. It selects leaders on a somewhat different basis, but I believe that in the economy of today it is an invaluable means of showing who is the leader. If, as some think, public activity is coming more and more to take the place of private activity in the organization and in the direction of industry, most important is it that there should be organized forums of discussion that will show who ought to be the guide, that will show the voters, when it is a question on which they have to vote, whom they ought to vote for; that will advise the Governor, if it is a question on which the Governor has authority, how he ought to exercise it wisely. I believe, therefore, that a body like this, representative and important, represents not only a culmination of the educational system of a community, as we understand it now, but an important unit in the political system as our children are coming to understand that. On all grounds, then, Yale deems it a privilege to welcome this body here. As an educational institution, we welcome you, for you give a most valuable kind of education, the education which grown-up men, schooled in practice, give each other. As an institution interested for more than two hundred years in public service, from the date of our earliest charter, beginning to train men for public service in church and state, we welcome you as representing the last and perhaps the most important idea of organized training for public service on which rests the future of the State of Connecticut and of the American continent. (Applause.)

Governor WEEKS. The next speaker upon the program is Professor C. L. Beach, President of the Connecticut Agricultural College. Mr. President, will you please come up here to speak?

President C. L. BEACH. Mr. Chairman, Ladies and Gentlemen, and the Board of Agriculture: The Secretary has given me such a latitude as to subject and time that in order that I may not be tempted to trespass upon your dinner hour I am going to read what I have to say to you this morning.

AGRICULTURAL EDUCATION.

ADDRESS OF PRES. C. L. BEACH.

It is a modern theory that every young man and woman should have the opportunity for an education, and that this training should be in part vocational. If the educational policy is to recognize the varying needs of individuals, then each student should have the opportunity of an education by means of, and in terms of, the things in which he lives. There can be no standard type of education, therefore, and each educational institution must arrange its curriculum to serve its constituency.

Education by means of agriculture is not a new conception. "It has long been recognized that the farmer should be schooled for his occupation, but no adequate system has yet been worked out." The desire for agricultural education developed early in Connecticut, and it will be instructive, therefore, and a matter of local interest as well, to recall the several attempts to establish agricultural schools in this State.

An agricultural seminary was opened at Derby in 1824. In addition to French, Latin, Greek, history and other subjects, the prospectus stated that practical surveying, the application of natural philosophy to the various kinds of machinery and agricultural instruments, testing the principles of chemical science in the mixing of soils, manures, making cider, beer, spirits and various other articles of agricultural economy will be taught. The school was discontinued after two years.

An agricultural department was organized at Trinity College at the time of its foundation in 1824. An announcement states that "as agriculture is the primary source of life and subsistence, and as a knowledge of it is highly useful to men of almost every profession, it is designed to make it an important branch of education. It will be the province of the professor of agriculture to explain the nature of different soils, and their adaptation to the growth of different vegetables, the structure of plants and the function of the several vessels by which they receive and elaborate their food, and their change into vegetable matter, the nature and operation of different manures, the proper succession of crops and all the means which conduce to the melioration of the soil. These and other theoretical instructions will be illustrated by all the practical operations of husbandry. An interest will be given to the pursuits of science, and our youths will acquire a taste for the active business of life and will go forth fitted to become useful members of society." But the students were more interested in the religious instruction offered, and no one appears to have wanted agriculture in that way at that time.

The Cream Hill School at Cornwall was started by Theodore S. Gold and his father, and for twenty-five years offered instruction in both scientific and practical agriculture and horticulture, embracing the most improved methods of tillage, rearing of stock, cultivation of trees, laying out of grounds, ornamental gardening, chemical analysis of soils, etc. A portion of each day was allotted to these objects, that the pupils might become scientific and practical farmers.

Agricultural instruction, particularly along chemical lines, developed early at Yale University. Mr. Norton was appointed professor of agriculture in 1846, and in 1850 published a text book called "The Elements of Scientific Agriculture." Yale Scientific School became the recipient of the land grant funds in 1864. William H. Brewer was appointed professor of agriculture and a definite course in agriculture was planned during that year. Two remarkable agricultural books "How Crops Grow" and "How Crops Feed," prepared by Professor F. W. Johnson of Yale College, were published in 1868 and 1870.

Storrs Agricultural School was established in 1881, a gift to the State by Augustus and Charles Storrs of a farm of 170 acres with commodious school and farm buildings by the former and $6,000 in cash by the latter, of which $5,000 was for fitting the institution for work and $1,000 for drainage. The State accepted these gifts and appropriated $5,000 annually for three years for maintenance. The first prospectus states "That the school being unlike that of any other institution existing in this country, the order of studies, the time devoted to the subjects taught, and to some extent the subjects themselves, must be determined by experience, and will largely depend upon the capacity of the scholars. Much of the instruction is not contained in text books, and cannot be given or acquired by the usual methods."

These early attempts to educate farmers' sons by means of agricultural subject matter at Storrs, at Trinity, at Yale, at Cream Hill and at Derby, were only partially successful, if not complete failures, largely because there was no subject matter to teach. There were no agricultural text books, no agricultural teachers. The science of agriculture had not then been worked out. The essentials for the admission of a subject to educational recognition, namely, a sum of useful knowledge sufficiently systematized to afford mental discipline to the recipient, were altogether lacking.

The desire for education in terms of agriculture was widespread, and finally culminated in an endowment by the national government of 30,000 acres of land to each state for each Senator and Representative in Congress. The proceeds from the sale of such lands were for the support and maintenance of a college where the leading object shall be to teach such branches as are related to agriculture and the mechanic arts, in order to promote the liberal and practical education in the industrial classes and in the several pursuits and professions of life.

Colleges organized under this act had a precarious development at the outset. The purpose and scope of their work was vague and indefinite. A college without a curriculum, without text books and without teachers is not apt to be a marked success.

It was not until about twenty-five years later, or in 1887, that Congress came to the aid of land-grant colleges and provided the means for investigation and research, out of which has developed the science of agriculture. The Hatch act, appropriating $15,000 annually to each state and territory for the establishment of an agricultural experiment station, has been designated as the most important single legislative enactment for the cause of education in this or any other country. The appropriations from the general government for land-grant colleges two years hence will amount to $50,000 for education and $30,000 for investigation to each state.

This brief review will lead to an understanding of the purpose and function of the college of agriculture and mechanic arts. These organizations were in part "a protest to the older educational methods and traditions." They were created by the people and for the people in recognition of the idea that education was made for man, and not man for education.

The agricultural college of today is a highly complex institution, expensive to equip and to maintain. The old single course in agriculture, presided over by a single professor, has given way, and in some of the advanced colleges more than one hundred distinct courses in agriculture are offered at the present time, requiring a large corp of instructors. The range of activities includes:

1. Investigation and research.
2. Post-graduate work.
3. Instruction of college grade to students of college rank.
4. Secondary instruction in agriculture to special students, who from lack of ability or means cannot enter or pursue a four-years' course of college grade.
5. Practical instruction in poultry, dairy husbandry, horticulture and domestic science, for farmers' sons and daughters by means of winter courses.
6. Summer school of nature study and agriculture for teachers.
7. Lectures at farmers' institutes, boards of agriculture, farmers' clubs and Granges.
8. Correspondence.
9. Personal visitation and individual help.

There is no logical reason why all of these activities may not be conducted in one institution under a single management, providing the work is properly systematized and sufficiently officered and generously supported.

COLLEGE INSTRUCTION.

The common idea of a college is four years of instruction superimposed upon a high school preparation, and leading to a degree at graduation. The agricultural college should maintain one department of this character, with the same entrance requirements and equivalent curriculum and academic rank as higher institutions of learning, and to confer equivalent degrees. This department will train teachers, investigators and farmers, who are to become leaders in country life. An institution must not lift itself above its constituency, however, and until high schools become more common, affording farmers' sons and daughters the opportunity for preparation, entrance requirements to the college of agriculture should not be placed above their reach. To require a high school preparation for admission to Storrs at the present time would in a measure defeat the aim for which the institution was established. In order to connect with the common school, a two-years' academic course is offered with instruction similar and equivalent to the first two years of high school. Those who have completed this course, or its equivalent, are admitted to the agricultural, mechanic arts or home economics courses, and graduated after three years of study, and receive a diploma. An additional year is required for the B. S. degree.

The nature and character of the instruction of the courses at the Connecticut Agricultural College is shown in the following schedule of studies, all required:

HOURS OF INSTRUCTION.

Subjects	Academic Course 2 yrs.		Agr'l Course 3 yrs.		Mech. Arts 3 yrs.		Home Economics 3 yrs.	
	HOURS		HOURS		HOURS		HOURS	
	Class	Lap.	Class	Lap.	Class	Lap.	Class	Lap.
English and Elocution,	468		360		360		360	
History and Civics, .	360							
German, . . .					360		360	
Economics, . . .			48		48		48	
Mathematics, . .	360		36		363	33		
Sciences, . . .	108	50	424	399	263	310	539	552
Agriculture, . . .		57	505	444			72	121
Mechanical, . . .				138	152	962		
Domestic Science, .							207	814
Dairy Husbandry, .			196	225				
Drawing, . . .		72						
Military Drill or Exercise, . .		216	24	324	24	324		324
	1296	395	1593	1530	1570	1629	1586	1811
Or Horticulture in place of Dairy Husbandry, . .			188	318				

INVESTIGATION.

Up to the present time experiment stations have concerned themselves largely with demonstrations having to do with the maintenance and fertility of land by means of proper care of barnyard manure, plowing under green cover crops, artificial fertilizers, tests of crops and their adaptability to various soils. Fattening trials with hogs, cattle, sheep and poultry. Breed tests. The life history of noxious insects and remedies for their destruction, the best treatment of fungus diseases. The analysis of feeding stuffs, ensilage of fodders, the promulgation of the balanced ration. The work of the station in the main has been demonstration work. This was unavoidable because of the pressure for practical information along all lines. The tendency has been for diffusion rather than acquisition of knowledge, education and demonstration rather than the discovery of new truths. It is recognized, however, that the time has come when agricultural investigators must address themselves to more fundamental problems. Many problems remain unsolved. The realm of soil bacteriology remains unexplored. Farmers suffer immense losses of live stock annually because no remedies have been discovered. Insects and fungus diseases of plants cause the loss of millions of dollars. Large areas of soil lie idle and unproductive because we do not know what to do with them. Soil fertility is lost, and means of prevention are unknown. No problems demand for their solution more searching and profound methods than do those pertaining to agriculture. For this reason agricultural investigators should be trained as "broadly and as severely as any other class of scientific men." Future progress in agricultural efficiency depends upon it. The well-springs of knowledge must not be allowed to go dry, and unless new discoveries are forthcoming, inspiration will be lost and retrogression will inevitably follow. Fortunately the recent Adams act, appropriating $15,000 to the experiment station of each state, stipulates that the money shall be used only for investigation as distinguished from experimental demonstration.

EXTENSION WORK.

Extension work comprises those activities which are carried on by the college for the most part away from the institution. It is an effort to be of service to the people individually, and in their own homes. An enumeration of some of the lines of extension will suggest the variety and scope of this work.

1. Correspondence with individual farmers.
2. Lectures at farmers' institutes and Granges.
3. Preparing and sending out farmers' bulletins.
4. Agricultural reading courses and circulating libraries.
5. Preparation of articles for the public press.
6. Coöperative experiments.
7. Agricultural exhibits at fairs.
8. Organized excursions to the college and elsewhere.

This department of the Agricultural College is receiving considerable attention at the present time, and it is recognized that a separate corps of trained men should be delegated to this work, and receive special appropriations.

WINTER COURSES.

Supplementary to its longer course the college offers short winter courses in dairying, poultry husbandry and horticulture. These are designed for those who lack the preparation, time or means to pursue a longer course, and who desire to gain a knowledge of the general principles underlying the dairy and poultry industries and horticulture. One hundred sixty-one students have been enrolled up to date in these courses.

SUMMER SCHOOL OF NATURE STUDY AND AGRICULTURE.

A course in nature study and agriculture, designed primarily for rural school teachers, is given during the summer. Familiarity with nature is no longer to be classed as a luxury in the educational dietary. It is a child's rightful heritage, and he either gets it or it is withheld from him. The successful teachers are those with a keen interest in the life about them, and in sympathy with the normal activities of their pupils. One cannot sympathize with things or people that one knows nothing about. The summer school is planned to meet the needs of teachers, especially those in rural schools, as well as of other persons who wish to gain a first-hand knowledge of nature and country life.

ENROLLMENT.

The total enrollment in long and short courses is 1,554, of which 310 are graduates, 161 students of the winter dairy, poultry and horticultural courses, 382 students of the summer school of agriculture and nature study and 615 part-time students have pursued studies for a period of less than four years in the regular classes. Eighty-six students have not yet completed their courses.

Much of the work that is being done at the present time is secondary in character, but when agricultural instruction is introduced into the high schools, or consolidated country schools of the State, much of the work now being done at Storrs can be passed over to other hands. The students of the winter courses, and many of the part-time students, can then obtain their training in agriculture nearer home. When agriculture is a part of the training for teachers in our normal schools, our summer school for teachers will not be needed, but until these things come to pass, our doors are open to all these applicants. There is no reason why a four-years' course of college grade in agriculture, mechanic arts or domestic science, a two-years' course in practical agriculture, short winter courses in the same line, a summer school for teachers, cannot all be conducted at the same institution. There should be no confusion when the purpose of each activity is kept fully in mind, and proper methods adapted to meet the respective needs. We have no apology to offer, therefore, because all of our work is not of college grade.

Hitherto agricultural progress in the United States has been powerfully influenced by the presence of vast areas of government lands, which were easily secured and easily brought under cultivation, giving large returns to investments. During the last fifty years there has been added to our farming lands on an average ten million acres of fertile land annually. The whole interior of our country has been brought under the plow in the last few decades. Our population, now ninety millions, will in fifty years have increased to over two hundred millions of people. The public domain is now practically exhausted. There is little land left for settlement, and the amount available will provide homes for the increase in population for not more than five years. The arid land possible of redemption will care for the increase in population for five years in addition. With population increasing at the rate of two to three per cent. a year, the surplus of agricultural products, now ten per cent. of our output, will soon be needed for home consumption. It will be but a short time, therefore, when every farm now under cultivation will be required to double its production.

That the rise in the price of land has already affected the cost of food products and living is graphically illustrated by figures recently given by Secretary Wilson: "On the basis of average wholesale prices ten years ago, for so much of the various commodities as could then be bought for a dollar, there must now be paid for milk, $1.30; for eggs, $2.05; butter, $1.52; cheese, $1.45; peas, $1.46; potatoes, $1.52; apples, $1.91; beans, $1.63. The growers of wheat and corn and cotton, of tobacco and of hay, come with increases ranging from 23 to 66 per cent. These figures prompt the *New York Sun* to say: "Pleasant for the farmer, mournful for the consumer." The promotion of agriculture, therefore, may well be considered a public policy.

WHAT IS CONNECTICUT DOING FOR THE DEVELOPMENT OF AGRICULTURE?

The last report but one of the Comptroller gives the expenditure of the State per annum as $3,500,000, in the total which may be analyzed as follows:

Legislative and judicial expense,	$872,638	25%
Humane institutions,	797,360	22.9%
National Guard,	202,186	5.8%
Road Commissioner,	272,891	7.8%
Penal institutions,	282,103	8.1%
State commissions,	278,120	7.8%
Education,	707,951	20.2%
Agriculture,	81,066	2.3%
	$3,494,315	99.9%

The 2.3 per cent. for agriculture includes the appropriations for both the Experiment Stations, the Agricultural College, the Board of Agriculture, dairy and pomological associations, the Dairy Commissioner, Commissioner of Domestic Animals, agricultural fairs, forestry, deer and fox bounties.

In view of this meagre appropriation for agriculture, one might say, "Mournful for the farmer, mournful for everybody." Mournful for the State when so small a percentage of the total revenue is devoted to the promotion of productive enterprises.

Two and three-tenths per cent. of the total revenue of the State represents an expenditure of $80,000. This seems a large amount, but it is at the rate of only six cents per $1,000 of the estimated value of the property of the State. It represents an expenditure of only eight cents per year per capita of the rated population of 1908. It is less than three-fourths of a day's earning of those engaged in agriculture.

The Storrs Agricultural School, now the Connecticut Agricultural College, was established by act of the General Assembly, April 6, 1881. Since its foundation to date, or for a period of twenty-eight years, the State has appropriated for he support of this institution $515,000. One-half of this amount has been invested in permanent improvements. This is a large sum, yet the amount is $100,000 less than was appropriated for he single year of 1907 for humane institutions, $144,000 less han the appropriation for the national guard and $202,000 less han the appropriation to penal institutions. I do not wish to be understood as urging a less expenditure for the care and support of the dependent and unfortunate, for the detention and correction of the vicious or for the support of the State militia, but rather larger revenues and larger appropriations in the interest of the productive classes.

DISCUSSION.

Governor WEEKS. We have all listened with a great deal of interest to this paper by President Beach. I know that I have, and I think you will all approve of it. I am very glad that he closed his paper with the words that he used. I agree with him to the letter, that more money should be appropriated for the revival and for the benefit of the agricultural interests of our State. For the short time that I have been in office, if I may use that term, I have given more or less attention to it personally. I am very much interested, and I think with this agitation it will bring it to the minds and the attention of those who have to do with making appropriations. I, for one, am very sorry, both for the State and the people of the little great State of Connecticut, that its penal and corrective institutions should take so much of our revenue. I do not know how we are going to help it. We are so near New York City that this matter of the immigration of penal classes into the State is a very serious one to our State. It is very easy for you to look at the history of our penal institutions, of our insane hospitals, and notice that the appropriation needs to be so large. I am sorry that it is so, but such is the fact. I did not intend to discuss President Beach's paper, but I could not help saying just that word.

There is another fact that I am going to leave with you before we take a recess. A few years ago it became my very great pleasure to listen to a lecture and during that lecture this statement was made that set me thinking. The thought that it suggested I am going to leave with you to think over during the recess. The lecturer made this remark. Speaking of the old, buried countries that archæologists are doing so much to unearth and explore, where they find the cities and towns buried in the sand, and he said it very forcibly, and it was this thought that he brought out more in particular, and which I want to leave with you. He said that centuries ago those same buried cities ad the same privileges, water-courses and everything, the same erdure and forests, the same as we are enjoying today, but they sed them up and therefore they paid the penalty, they became ead. That was the result, they became buried beneath the sand. 'hink that over. Think more of conservation of the resources hat we have. I just wanted to leave that thought with you.

The time has come now, ladies and gentlemen, in accordance vith your program, for a recess, and without further remarks ve will take a recess until 2 o'clock.

FIRST DAY — AFTERNOON SESSION.

Music.

Meeting called to order at 2.15 o'clock, Vice-President Wilson I. Lee in the chair.

The PRESIDENT. I recognize that it is considerable of a fall rom the Governor of the State as your presiding officer to the icumbent of the chair. I feel that it is a good deal like going rom the sublime to the ridiculous. But I was very much pleased iat we were honored by the presence of the Governor this morning, which not only added dignity to our meeting, but I think it erved to interest him in what we are doing, and to show him iat there is a necessity that this State Board should be well istained by liberal appropriation from our legislature.

This afternoon and the evening tonight will be devoted to oultry raising. Now I am something of a farmer. I have two undred or more of horned stock, young and old, but I do not wn a feather. I buy my eggs, and I guess it is a good thing for ie that I do, for I realized that the more hens I had on my farm ie poorer I would be for it. Now that is not for the reason iat I do not think there is any money in the poultry business or anyone that understands it, and especially when you have got man behind the hen, or a good woman behind the hen, it is a ood business, and, confidentially, I will say to you, and with all ue respect, that it would be a mighty sight easier for a good voman back of the hen than for a man, because I think she can iake more of a success of it than he can. Years ago when I ved in the city I always kept hens. I had a small flock that used o do very well, but when I went out on my farm, not liking them particularly well, or not well enough to get into the game, as the boys say, I realized that the fewer hens I had around the better. When I can find a man like some of the few gentlemen I could pick out in this audience to come over and manage the hen part of the establishment, and live with us over there, then it may be all right for me to go into the hen business, but for the present I know it would be a losing game, and I think I am wise enough to stay out.

Now the first speaker of the afternoon is a gentleman who, for some time, was at the head of the information department of the Sargent Incubator Company. He is well qualified to talk to you upon the subject which has been assigned to him, and I take great pleasure in presenting Mr. Charles F. Stephenson, who will talk to you about the use of the incubator.

Mr. STEPHENSON. Mr. Chairman, Ladies and Gentlemen: It would be presumption on my part, I think, to attempt the instruction of a Connecticut audience of this character upon the subject of the incubator. That is not my intention. Rather, I would bring to your notice some of the little things which in the incubator, like in life, are of most importance; and which when neglected or forgotten cause disaster to follow. I would bring some of them to your minds like an old friend who, in our multiplication of duties, we have overlooked, and perhaps have forgotten, but when borne in mind and brought to our attention we greet them as old friends, and put them in practice and go ahead with added success. With that idea in mind I would like to talk upon incubation.

Let me say first that what I wish to say springs from ignorance, if I may so speak of it, of those who attempt to run incubators. By correspondence all over the United States with people who have been in trouble the information department of the concern with which I am connected, and of which our Chairman has spoken, except that we call it the "trouble department"— and it was that department that I had charge of with the company, found that out to be the case. But my experience comes not only from my connection with that department but from the sale on the floor of incubators, and also from their operation. I speak this way, not to show that I know anything about incubation, for I do not, but simply to show you that I have had the opportunity to meet people face to face and learn from them just what their troubles were, and I suppose it is air to assume that there are some people in this audience, at east, who have had the same troubles.

What then is the purpose of incubation? Incubation is either rtificial or natural, and its purpose is to produce the very best owls that we can. Science tells us that the most important art of the raising of children is the consideration of the preatal condition, and that is exactly, as it seems to me, the sense in hich we should consider these questions of incubation. The icubator, whether artificial or natural, is blamed with most of ne fault for failure, and if you bear that in mind you will gree with me, I think. It is usually the case when there is a ailure that the incubator, or the manufacturer of the machine, ets the blame for failures. I think you will clearly agree with ne if you will think back a moment. The troubles that you have ad have been laid to the incubator. We forget one of the main oints, to find what stock the egg came from which produced ne chicks which we wanted to be good, but which resulted in eing bad. We cannot find, all of us, the good stock that we ant good, the history of which can be given to us, and which ometimes even when given to us cannot be relied upon, but in electing the stock we must bear in mind the first primal fact, get ne very best stock that we can from the most reliable breeders, hose word can be accepted as the living truth, and from that ock as the basis, breed up to the stock that we desire, which hall produce a progeny that is going to make money for us. he influence that parents have upon the young chicken is of undamental importance. From those parents will come either ealth or disease, strength or weakness, or conditions which will ender them liable to contract disease when unfavorable circumtances are presented instead of having the stamina to resist and nrow off disease. That is a thing that we should remember nder all circumstances. It makes no difference what our purose may be, whether it be for fancy fowls or for table or eggs. ne point we must never lose sight of, is the pre-potency of ither one or both of the parents. What is the strength which ne or both of the parents is to transmit to its progeny, or their rogeny, the characteristics which we want to find in the chick, hich when it shall have matured will be just what we want? f it be for the fancier, if it be for the table fowl, if it be for eggs, e must be very careful to have so bred that the pre-potent power hall be strong enough to reproduce exactly what we want.

So we come now to the consideration of the egg. How many eople really stop to consider what is a good egg when it comes to the matter of incubation? Lots of people will take most any old egg, and think if they are only subjected to heat and moisture in the incubator, or under a hen, the chicks will be all that is desired, but if we will stop to consider a moment, it will be seen that we want the very best, eggs that are surely fertile and which are strong and virile. Therefore, we should take those that are laid in the most natural part of the breeding season when the fertility is the strongest, when the strength of the fowls is not being given to feathering or to gathering their strength, or to overcoming some disease, or to getting rid of the effect of close quarters in which they have been kept, or from poor feeding conditions. The eggs that we use, in the first place, should be from birds, or should come from stock that has been well fed, abundantly fed. Not fed on a little grain now .and then, not stock that has been fed on a little mash given them, but stock that has been abundantly fed with egg-making food, from fowls which have had plenty of exercise and lots of room, lots of grain, lots of good food. But even with all those conditions in our favor there are many little things that are forgotten, but which are of vital importance. How many times we go through a farm, large or small, and find the drinking dishes empty, a thing that ought not to occur. I see nods of approval on that. I am glad there is one point which reaches you. Fowls that have been mated wrongly in the proportion of males to females, or rather of females to one male, bring us to a point which should be very carefully considered. It depends largely on the breed which you are using. The proportion should be right in any event, but the strength of the breeds differs somewhat. Then too we should be very careful with the stock, and see to it that it is stock which has had plenty of room for good healthy exercise. It is very much better to give them too much room in their breeding quarters than it is to give them half enough room.

Now in the matter of the formation of the egg,— let me call your attention to a fact or two in regard to eggs, both before and during incubation. You know, all of you, that the egg has two sets of veins, and the sack which contains the fluid in which the germ floats. Now some people will go ahead and use or handle eggs very roughly, or handle them roughly in turning them, so that they become practically unfit for incubation. They will drop them or move them around without any thought whatever that inside of the eggshell there exist veins, blood-vessels, upon which the life of the chick will be dependent, and which, if any of them are broken, or if the sack is broken, death to the embryo may result. People do not stop to think of that. Yet it is true. So when you are putting away your eggs for incubation, please remember to handle them, every one of them, very carefully.

Then too, some people are apt to overlook the importance of using fresh eggs for hatching purposes. People say, oh well, it doesn't make any difference how long eggs are kept for incubation. Perhaps that may be true, yet it is a fact that if eggs are kept more than one week they begin to deteriorate, and after that the process of deterioration goes on more rapidly. It is true that in some cases eggs have been known to keep five weeks and still give a fair hatch, but that is an exception that proves the rule. Eggs should be kept where there is a cool temperature of from forty to forty-five degrees. Better not let it go below that or much above that, because experimentation has shown that incubation begins at a temperature of fifty degrees. After incubation begins, if the process progresses considerably or progresses a little and then is stopped the germ is likely to die. More frequently it will die than live and hatch. After eggs have been kept and properly handled, we then take up the question of incubation itself. You will find that after the incubation has progressed for three or four days, if you look through the egg tester you will see that the sides of the veins show very darkly, so as to almost make the yolk of the egg opaque; beginning with the third day and so on, growing gradually darker and darker until, by the fourteenth day, the egg should be entirely opaque. These veins continue to develop that color during that process of incubation. The saying is that these veins float and turn back, but whatever may be the fact about that, they are of the utmost importance, because they give nourishment to the embryo during the first few days, or usually up to the fifteenth or sixteenth day. Hard usage of the eggs during this time will usually result in the breaking of the veins and hence the killing of the embryo. Therefore, you should be careful during this period, particularly careful in the way you handle the eggs.

Now in the matter of incubation, let us imagine for a moment that we have an incubator before us. Let us see just what is to be done. It will take only a moment. So many mistakes are made right here that I have presumed to call your attention to it, and emphasize this part of the subject. Let us suppose then that the incubator stands before us. We will assume that it has been set up. The first thing to do is to raise the indicating rod, and let it fall back so as to see if it binds anywhere. The importance of that is in the fact that if it does bind we want to discover it, because we do not want that there should be any friction of the regulating arm which raises and lowers the disc, and thus prevents the distribution of the proper quantity of heat throughout the chambers. If this is all right, then examine the little square ball that is always upon the left end of the regulator arm, to see that that has not been moved. If you find that the little disc hangs directly over it and covers the hole from which the hot air escapes into the room, then you can go ahead and put your heat in, and that brings us to an important point. It probably is the most important part in incubation, and that is the lamp. It would amuse you perhaps, as it has me, if I were to stop at this point and tell you how many questions we sometimes receive just on this point alone. The questions come into the trouble department day after day, sometimes thirty or forty letters pile up, all saying: "What is the matter with my lamp? It smokes." I wonder how many of you have had smoky lamps. Will those who have please raise their hands? Well, some of you have. Is it the fault of the lamp or is it the fault of the user of the lamp? I will say that it is never the fault of the lamp, because when the lamp leaves the factory it is in perfect condition. It is the fault somewhere between the manufacturer and when it gets into the hands of the user, or the operator of the incubator. When you go home and you want to start your incubator, you find that the lamp smokes, and you wonder whether it is going to smoke this time. Let me tell you what to do. Clean up your lamp, put in a new wick, and fresh oil of the best quality. Even look and see if the chamber of the burner, the flat part that extends around the cap, see if that fits up close and tight to the bottom of the lamp flue. If it does, all right. Then see if the little piece of mica in front of the flue is fastened in tight. If it is, all right. If it is not, put in a new one. Always keep it clean so that without any difficulty whatever you can immediately see by looking in just what condition it is in, how high it is, and so on. Still your lamp may smoke. And here comes a very common source of trouble, that is almost never found out by a person who uses an incubator, and that is the fact that the wick tube may be just a little bent, so that the flame as it rises will strike against the places in the burner of the lamp and smoke, and the more smoke, the more rapidly will your little flue in the side part clog up and continue to clog up until finally you have got a very bad heater. Sometimes if you let the lamp fall, or let something fall which strikes upon he burner it becomes a little indented, so much so that the flame vill strike against that particular place, and then you have nother smoky lamp. I presume that of all the complaints that ome to the information department of the incubator company hat lamp complaint will constitute fully fifty per cent. if ıot more, of the total number. The trouble that I have just nentioned is perhaps obscure, and perhaps some of you have ever heard of it before.

Then when we have gone that far we must test the therıometer. Have you a clinical thermometer at home? If you ave, try it. If not, perhaps you can get one from a local doctor, o as to test your own thermometer and see if it registers the. ame. Then take care to see that the hot water is mixed up in ifferent parts, so as to see that the different temperatures within he water shall be equalized. That is all very important. Therıometers when they are sent out by the companies with glass re apt to vary somewhat, but that is no reason why they should e changed, because the glass does change. It will perhaps ary quite considerably. Sometimes a thermometer received rom an incubator manufacturer will vary from one-half to ve or six degrees. I have known of instances where they vould vary as much as eight degrees. Always test your therıometer, but do not blame the incubator manufacturer because ou get one that is too high or too low, because they have done ll they can. Then if you run your incubator properly, according the directions of the incubator manufacturer, you should have ood success all the way through.

There is one point that I wish to correct, which some manuacturers will insist upon in their directions, and that is never to hange the regulation of your machine. Now the regulation f the machine for many people has seemed to be a difficult thing, ut I want to tell you one thing, and if you will follow that I hink you will have no trouble. If you will remember it I ıink it will aid you. After the machine has been warmed up, nd before you put in the eggs, the temperature having been or the day 102½ or 103, whichever you decide upon to begin vith, open the door of the machine, let it hang down and stay hat way until the temperature within the machine is shown by he thermometer to be ninety. It cannot go much below eightyve, because the thermometer ends at eighty-two or three. At hat time when you have lowered the door the disc should have een raised about an eighth of an inch, and the thermometer hould have registered 102½ or 103. After the temperature has gone down, close the door, and then go away for three or four hours and forget you have an incubator. At the end of that time go back, and then after opening the door see what the temperature by the thermometer is. If the temperature is the same, same as you set the machine, and the disc is right, being one-eighth of an inch above the flue, all right. You can adjust it by the thumbscrew at the top, and then repeat the operation for two or three times after that until you can do it every time. By that simple expedient, adjusting it with the thumbscrew, you can quickly adjust it. It never fails. I advise you, however, never to put your eggs into the incubator until you can bring that condition about.

Some manufacturers will say never change the regulation of your incubator after the eggs are put in. I do not know why they should say it, but they do. About the twelfth day the eggs, if the incubation has been correct, the embryo of the eggs will have reached their maturity, but not their full size, and then the amount of animal heat which will be thrown off will raise the temperature considerably, and you must take care of that by the regulation of the machine. It is well to look after that every morning. I suggest that you do it in the morning because you can watch it then during the day. It is better to do it then than at night because you cannot watch it as well at night. You may have to do that for twelve, fourteen or fifteen days, but ordinarily it should not go beyond the thirteenth day.

One other point is in regard to the cooling of the eggs. It is a little point, but one of considerable importance to success. If you go into an incubator cellar sometimes you will be surprised at some things you will see. I went into one not long ago in which there were fifty odd incubators in operation. There were some trays on top of them cooling. I said to the man in charge, "What is your guide for the cooling of the eggs?" "Oh," he says, "by the feeling of my hand." I talked with him a little about it, and he said he thought that was all right. Well, as a matter of fact, it is all wrong, because you know that the hand becomes benumbed, so to speak, so that it is not very sensitive to different temperatures with which it comes in contact throughout the day. The hand is not sufficiently sensitive, but if you will take an egg, after the eggs have been on top for a little while, and just touch the edge to your closed eye-ball, you will find it always right. You can tell very readily whether they are sufficiently cooled. If you find that they are a little cool, put the eggs right back. That is always a sure test.

Another thing: When you handle your eggs be very careful to see that your hands are perfectly clean. I mean by that to be sure to turn the eggs the first thing when you go into the place where your incubators are. Always be sure to do that, because, f you first take care of the lamp, your hands will have more or ess oil upon them, and by doing that day after day you will soon get the eggs into such a condition that the vitality will be lessened, owing to the stopping up of the pores of the shell, and a poor hatch will result.

I have found with most farmers that a large proportion of the troubles which they have with incubators come from cooling, and from the testing of the eggs. People would write to us in answer to a long list of questions to get at the bottom of the trouble. Among them we always had this question: What was the temperature of your room? And we usually got back an answer showing that the temperature was forty, or forty-five or fifty degrees, sometimes sixty degrees. Now stop and think a moment, friends. That egg in which there is a living embryo is in a temperature for the greatest part of the time of 103 degrees, possibly 103½, and like a flash you take it and subject it to a temperature of forty, or forty-five or fifty degrees without covering. Why, if you and I were subjected to as sudden a change as that without proper covering it would make us shiver, and yet you would be surprised to see what a large number of people do that. That is another little thing to remember, but it is one of vital importance to success.

Mr. Chairman, my time is up and five minutes more. I thank the audience for their very kind attention. (Applause.)

DISCUSSION.

The PRESIDENT. This is an interesting topic, and I have no doubt there are some who would like to ask some questions. Would the audience like to ask any question?

Mr. COSGROVE. I would like to ask a question of the speaker. I notice that when you set eggs under a hen that after a week or ten days the eggs get shiny all over. They look very different from those put in an incubator. Has that anything to do with a material put on by the hen or which gets on from the hen's body in any way? What is the cause of that shiny appearance?

Mr. STEPHENSON. I cannot tell you the cause of it. I can simply state this fact. I have made a good many tests along that line, and have found that when the incubator egg made a good hatch the eggs have always looked shiny. When I have called my wife's attention to that she has said, " Why, they look just exactly like hens' eggs. I have heard people say that the shinny appearance comes from the oil of the feathers of the hens, but I cannot believe that is the case in an incubator, because an incubator is not built that way.

QUESTION. Some people believe in cooling the eggs by leaving the door open and not taking them out. Is that a successful way to do? Do you advise that?

Mr. STEPHENSON. There are two reasons why you should not do that. One is that the eggs in the front half of the tray are cooled much more rapidly than those inside. The second thing is, you are wasting that much oil and that much good heat. The better way to do is to take them out and close the door, and in that way keep the heat until the eggs have been cooled sufficiently.

QUESTION. Do you think there is any harm in washing eggs before putting them in?

Mr. STEPHENSON. No, sir.

Mr. WAKEMAN. You spoke of taking them out in a room where the temperature was too low. In case it was more convenient for a man operating only one machine to have them in a room where the temperature was under sixty, what process would you follow of covering, or how would you have them protected from the temperature of the room when the eggs were being cooled?

Mr. STEPHENSON. The ideal temperature in which to keep the eggs is about that which they have been used to before being put in. That is the ideal temperature, provided you have the proper amount of moisture, but if your machine is in a room of that kind, where the temperature is sixty, it is very much better, and I think always safer to heat a flannel bed blanket until it is warmed up to 103 or more, and then fold it and wrap the tray bottom and top, excepting one-half. I assume that you are using an incubator that has two trays in it. I would do that. Cover one-half of the tray. I would take out only one tray at a time, and cover one-half, bottom and top, because the bottom of the egg will cool as rapidly as the top. Have a good strong light with a reflector behind it, and that will throw a light clear through the egg. One of the best egg tests is to use acetyene gas, or the light produced with carbide. That will give an excellent light with a good reflecting power. You can size up he incubation in one day by it, and you can work very quickly with it.

QUESTION. I think the speaker must be in league with the ncubator men. He tells us that we have no right to kick if they send the incubators out with thermometers that vary. I do not see why they should send out incubators with thermometers that are sometimes as much as six or seven degrees off. Why do they not test them before they send them out?

Mr. STEPHENSON. Many of them do now. During the time hat I was connected with the Cyphers Incubator Company they had that complaint many times, and in some cases had some rouble by it, so that now they test their thermometers before hey are sent out.

Mr. COSGROVE. I have a 360-egg incubator, with a hanging hermometer that hangs up about half an inch or more above the eggs. The instructions are to run that at 103, but I have found hat when I set a thermometer that rested on the eggs that when t got to 103 the hanging thermometer was 105 or 106. Now what ought I to do? Should I be guided by the thermometer that rests on the eggs, or run it, as the directions read, at 103 by the hanging thermometer?

Mr. STEPHENSON. It should be 103 by the suspended thermometer always, except in some cases where the principle on which the machine is made differs.

Mr. COSGROVE. Sometimes the contact thermometer will not show over 101 or 101½.

Mr. STEPHENSON. I know that is so.

The SECRETARY. I understood you to say it was not wise to change the temperature of the eggs too quickly when you are cooling them from 103 to 40 or 50. When the old hen comes off her nest doesn't she allow them to change temperature very quickly?

Mr. STEVENSON. Exactly.

The SECRETARY. Isn't it wise to follow the habits of the old hen so far as possible?

Mr. STEPHENSON. Yes, sir; but you must bear in mind that we cannot always follow the hen exactly in all of her methods. With an ordinary good setter, if you will test the temperature of her eggs in some ways as I have suggested for an incubator, you will usually find that the hen knows when they have cooled sufficiently. You will usually find that the eggs have not grown too cold. That old hen is usually blessed with an instinct that it would be good if some of us had. She appears to know when it is just right to go back to the nest. You will find that to be the case usually, I think.

President LEE. I have a neighbor who lived in the city. Two or three years ago they took a place out in the country. They took a man with them and, being a city man, he naturally studied the farmers' conditions. He said to this lady the other day, "Mrs. Corbin, the farmer makes more money when he is selling his eggs at twenty-five cents than he does when he sells them for fifty cents," and she says, "How is that?" "Why," he says, "when he is selling them for twenty-five cents a dozen he has plenty of them, and when he sells them for fifty cents a dozen he doesn't have any." Well, that is my condition. I mentioned the fact that I used to keep hens. I was born and bred in the country, and always having had plenty of fresh eggs on the farm I never could put up with anything else. When eggs were fifty cents I thought I could make them lay, but I didn't always do the trick. There was a very good woman who could do the trick who lived within some three or four miles of us out in the country, and where I could always go and buy fresh eggs. Somehow or other she was always able to get them when there was none to be obtained elsewhere. It takes a woman every time to get the best results for a flock of hens. My experience with her was one of the best lessons that I had on woman's ability to handle hens. Now you gentlemen here have made more or less of a success in farming, and I feel that perhaps you know a good deal about it. Certainly a good many of you know a good deal more about it than I do, but I want to say, gentlemen, that there is not a man in this room that has made a success of farming, or any kind of a success, unless he has had a mighty good thrifty wife to do her part. (Applause.) There may be two or three bachelors here who ave made something of a success, but their success would have een a dozen times greater if they had had that thrifty wife.

Now we have with us this afternoon Mrs. Mollie Mc. Allen, vho is going to talk to us on "A Woman's Success in Poultry Culture." She is an institute worker in New York state, who is vell qualified to talk to us on that question. She is a modest ady. A little while ago I told her that there was some complaint his morning about our speakers talking from the floor, and I vas going to ask her to take the platform. She says, "Don't do t," but in spite of her objection I am going to ask her now to ome right up here where all of these gentlemen can get a good ook at her. (Laughter.)

Mrs. Mollie Mc. Allen. Mr. President, Ladies and Gen-lemen: There are two or three reasons why I should not like o go on the platform. One of them is, those yellow chrysanthe-nums which decorate the platform do not correspond with my omplexion. Another is I see that you have a stenographer resent, and I want to be where he can hear.

President Lee. We will put him right up on the platform vith you, if you say so.

Mrs. Allen. Oh, no, I thank you. I would rather stand ere.

President Lee. Or we will remove the chrysanthemums.

Mrs. Allen. Really, I think I would like to get down among he audience, if you will let me. I am sure I can make you hear etter down here. I am sorry in the first place, that the title laced upon the program, "A Woman's Success in Poultry Cul-ure," is not quite the way I would like to have it read. The vord "success" should read "experience." "A Woman's Experience in Poultry Culture." I do not wonder, however, that he title appears wrong on the program, for if you could ever see ny handwriting you wouldn't wonder at anything which appears. At any rate, my experience in poultry has not been entirely suc-essful. I have been breeding fowls with some success but with nany a failure. I believe that my failures have taught me more han my successes. Therefore I want to tell you today of some of ny failures as well as about some of the successes which I have nade in poultry culture. There is one thing I am going to ask the udience to do and that is, I would like to have each one who is keeping thoroughbred poultry to hold up their right hand. I think there are more hands up in proportion to the audience than any other I have spoken to before. It is a happy omen. Now I am not going to talk about thoroughbred poultry from the fancier's standpoint, nor from the showroom standpoint, but from the point of view that thoroughbred poultry brings in more money to the farmer than any other kind of poultry which you can keep. You can get more money from the sale of white or brown eggs, whichever the market demands, from thoroughbred birds than you can for mixed eggs. You can get a higher price for broilers in the market from thoroughbred stock. In Oswego I get two cents above the market price for my thoroughbred broilers more than I could get for broilers from mongrel stock, with which, unfortunately, I had to start.

Some urge against keeping thoroughbred stock as compared with mongrel stock that it is much more expensive, that you must have a model building in which to keep the stock, etc. Those who are keeping thoroughbreds may not be so much interested in this point, but I beg their indulgence for a few moments while I tell you a few of my experiences in going from mongrel stock to a flock of thoroughbreds. You can go back to your neighbors and tell them what I say, and I am sure if there were any of them here who are trying to work over their flock they would go back to their neighbors and encourage them in that work, for it means better poultry and more poultry. When we went on the farm, after the farming implements and the horse and what stock we kept were bought, I found that I had only eight dollars to begin my poultry work with. Now eight dollars will not buy very much thoroughbred stock. I wanted first, however, hens to lay eggs to raise broilers for market. I could not buy thoroughbred stock enough to answer the purpose and therefore I was obliged to begin at the bottom and begin with mongrel stock. I bought twenty mongrel hens of all sorts, colors and descriptions for five dollars and then I found a bargain. You know how dearly a woman likes a bargain. Well, I found one. I found a thoroughbred bronze turkey and got him for three dollars. I do not believe that many of you will find such a bargain as that. Well then, you know, the poultry papers have been telling us, and the authorities also, that if we have thoroughbred poultry they must be kept in a model building. Well, I think that my poultry house comprises more of the "Don'ts" of poultry house construction than any other in which I have set my foot. It is an old made-over granary. Never was intended for a poultry house in the first place. I do not believe you have any more of them in Connecticut. I have seen very few of them in New York. It is a building with the walls sloping out so that it will catch all the dust possible on the inside. When we went there the man had been using it, or rather abusing it, for a poultry house; it was in wretched condition. There is a basement under it and in that basement he had his hens. He expected them to thrive in such a place as we found there. On the next story there was quite an elaborate system of nests. All sorts of devices. On the third story he had his sleeping chamber. They went upstairs to bed after their duties of the day were done. That house was covered with tarred paper which had been on for several years. It was so old it did not even smell of tar any more; it was in a state of almost indescribable filth, just simply alive with vermin, and certainly was not a place which appeared very encouraging for success in poultry culture. It took us I know not how long to get it cleaned up. We drew out load after load from the basement and, among other things, we found bones, great long bones, corncobs, lots of straw and even dead turkeys. There were some young turkeys and one or two old dead hens. I have often thought when at home in looking at that building, how, with a poultry house like that, any man could wonder why his hens did not lay. Why, the poor things could not manage to live, to say nothing about laying. After we had cleaned it out and torn out the tar paper, the elaborate trappings and everything else, we stopped up the cracks and fumigated with sulphur, and then we whitewashed with a mixture of whitewash and carbolic acid, and let it dry. And do you know, even to this day, that place is sometimes troubled with vermin. I cannot keep them entirely out. I say this because I want to say to those who are building henhouses that I advise them to build them, so far as possible, without any cracks or crevices. This building, of course, as I have said, was constructed for a granary and, although we gave it a thorough fumigating and whitewashed it, we have not been able to get rid entirely of the mites. We can keep them down by kerosening the perches each week, but have not been able to rid the building entirely of them.

About the tenth of April we installed our flock of twenty mongrel hens. I am going into a little detail in order to show you how I worked from those twenty hens into thoroughbred stock without paying out a dollar except money which the hens brought in. Anyone can do the same thing if you have the mongrel stock for a foundation. I heard Mr. Ayer, one of our American Poultry Association men, say at an institute one time that no one could make a success or could make any money by keeping mongrel stock. After he was through speaking I arose and gave these details which I am going to give you in a moment, which proved to him that I certainly made a profit from keeping mongrel stock, and he got out of it by saying that it was a woman did it; that no man could do it. (Laughter.)

Well, from the tenth of April to May I sold $3.16 worth of eggs beside those that I used on the table and those that I put under a hen. She kept on setting and she raised ten little fluffy chicks for me. I have made no account of the eggs or poultry which we used on the table, because I consider that was pay for the work. I have not charged the hens with labor, neither have I credited them the eggs, fowls and broilers which we used on the table — for if we leave these in you would soon see that they pretty thoroughly paid for all the labor which they cost. About that time a friend, a farmer in the vicinity, who had been using a 200-egg incubator, offered it for sale. Well, you know that fools rush in sometimes where angels fear to tread. I had never had any experience with running an incubator, but I thought I could do it. I was green in the poultry business. We know a whole lot more about poultry when we start in than we do usually after several years. Fortunately, I am blessed with a husband who is a mechanic. We bought that incubator. He investigated the wiring and found it was bent. That, of course, saved us some trouble. He soon straightened that out and we ran it for two or three days and then started in with eggs. I had a little bit of Scotch caution, and I did not fill it with two hundred eggs to start with. I put in sixty. I hatched twenty-eight chicks. There were only forty fertile eggs. The next time I learned something from that failure. We started the incubator again and put in nine ducks' eggs, thirteen turkeys' eggs, ran it a week and then filled it up with 170 hens' eggs. From that experience I discovered that it would not do to put in all sorts. I did not hatch one single duck. I hatched two turkeys and 115 mongrel chicks. At the same time I had set about using this incubator for the purpose of raising broilers. I put under my setting hens some thoroughbred eggs which I had bought. There were thirteen Buff Leghorns and thirty-nine Barred Rocks. I was experimenting to see what kind of breed was best for my purposes. I did not know very much about thoroughbred stock, but I had found from my earlier hatches that the hawks and crows, which are quite numerous in my part of the country, took off the white ones more rapidly, so I confined myself to dark chicks. I found also that the Oswego market called for heavy broilers of from two and one-half to three pounds and that it always preferred the brown ones. You know we have to be guided a good deal by our market conditions. So I just have the thoroughbreds which I hatch, the barred Plymouth Rocks. Here was another little bit of discouragement also which I met with at the time, for out of those thirty-nine eggs I hatched twelve chicks and seven out of that twelve were cockerels. One pullet broke her leg before the summer was over, the horse stepped on her, I believe; but I had too much Scotch grit to give up as easily as that, and so I kept at it, and my thoroughbred stock, such as I was able to produce, I used for breeding stock. But I was going to tell you how much I made that year out of those twenty hens. I sold from those twenty hens $34.70 worth of eggs. I raised eighteen turkeys. I kept four of the very best hens for breeding purposes and sold the rest of the turkeys for $20.76. From the broilers I received $33.05, and collected from the tenth of April to the first of January on those twenty hens, $48.89. That is not a large story. I am not here to tell large stories. I cannot tell you about any nine-thousand-dollar building or keeping fancy poultry, but I can tell you of a fair profit made on a farm with poultry, starting with ordinary mongrel stock and working along into a thoroughbred flock.

The next year I raised three hundred chicks and sold 9,642 eggs, amounting to $158.80; broilers, $81.34; fowls, $17.95; and forty-one turkeys, $74.74, or a total of poultry products sold from about seventy hens and four turkeys, $332.83. The food cost me $146.16. I cleared from just an ordinary farmer's flock of about seventy hens, $186.67.

Owing to a change of circumstances, the next year I did not raise so many broilers. I was obliged the next year to take entire charge of the whole farm, and you know you cannot spend a great deal of time with poultry on a 107-acre farm. So I simply raised enough to replenish my flock of Barred Rocks. I want you to notice that where you have thoroughbred broilers and the pure-colored egg, what a difference it makes. Not in the number of eggs laid, but in the price. That year I had just about the same number of hens, about seventy. You will notice also that they averaged just about the same. They were kept in one flock. They laid 11,682 eggs instead of 9,642. I sold 910¼ dozen for $210.34. Two geese, $3.92. Twenty-four fowls, $16.10. Thirty-six turkeys, $67.34. I sold twenty-eight broilers at $28.05. You see that is a good deal higher than the other broilers brought me. It is a good deal more for broilers, as you will see, than the mongrel stock brought. You can tell when your broilers are going to be ready, and you can always contract to sell your broilers ahead because you can rely upon them, if they are thoroughbred stock. Your customers know just when they are coming, and they are better in every way; while, if you have raised mongrel stock, you do not know what to expect yourself until you get the feathers off. The total that year was $324.75. You see the total sold that year, although I did not raise anywhere near three hundred, was almost the same as the year before. This year it was $324.75. The feed cost me more. It was $164.84. Feed has been rising every year. The gain was $166.11. I shall have to tell you why that gain was cut down. That dread disease, the blackhead, broke out in my flock, and in consequence of it I lost about half of my flock of ninety turkeys. They were almost grown for table purposes, so I lost not only the sale of the fowls, but the feed which they had eaten up to the time, which was quite a bit for forty-six turkeys.

I do not know as I should tell you the details of my struggle with that outbreak of disease, and I hardly know what you would like to have me talk about the most. I have had my own way so far and said what I wanted to, but now I am going to let you choose a subject for me if you will. I do not know as I can talk about it, but I will try, if it relates to poultry. There are so many subjects arising, subjects like the feeding of chicks, the winter production of eggs, and the care of fowls for the production of winter eggs, so many subjects, that I hardly know which one you would be interested in the most or would like to have me talk about, and I am going to let you suggest your own subject.

Mr. COSGROVE. I have heard it said that you could not keep turkeys and hens on the same location; that there was a parasite which made it unwise to do that. Although it did not do much harm to hens it was fatal to turkeys.

Mrs. ALLEN. That is what I discovered, but I do not know that the hens were to blame for it then and I do not believe they are today. Shall I tell you about that flock?

President LEE. Yes; I am sure the audience would be glad to have you.

Mrs. ALLEN. I did not know anything about the disease, but all at once I found my fowls drooping and dying. I lost a half when most of the flock were pretty well grown. I found the principal symptoms that were present was the yellowish character of the droppings, and I had rather made up my mind that it was a liver disease. I began and dosed those turkeys with calomel. After I had dosed them pretty thoroughly I gave them some tonic to help brace them up and I am sorry to say that I saved some of them, because it is a germ disease, and the germs remained n the bodies of those fowls to be distributed all over the farm after they recovered. There was nothing written on the subject that I could get. Finally I wrote to the experiment station, and I got an inkling from the Rhode Island station that my turkeys were suffering with blackhead. While my turkeys' heads were not all black, they sent me a bulletin and from that I decided that blackhead was what was the matter with my turkeys. They did not know what caused it then and only surmised that it was a germ disease. Of course, if it was a germ disease, I was afraid it might be contagious, and so I fed those turkeys so that it was absolutely sure there was no contact of any kind with matters that should not be in their feed. They could not come in contact with their feed so that any of the droppings could get into it. I was very careful about that. I dissected some of them and I found in a good many cases that the spleen and intestines were enlarged; that is, that the walls were thickened, and I began to believe that it was an intestinal disease first and then became a liver disease. After they had reached a certain stage there were spots on the liver, a sort of orange red. I asked some of the authorities if it would not do them good to give them some sort of disinfectant which would clear the intestines of the germ, and they said that I couldn't give the turkeys anything that would kill it, but they changed their minds about that later. As I said, I fed those turkeys so that by no possibility could the droppings come in contact with their food. I separated every turkey which showed the least symptoms of the blackhead and took all the pains I could to prevent the spread. If I found that one of them had the disease or if one of them died from it, I either buried it deeply where by no possibility could any of the others come in contact with it, or burned it. Gradually I was able to eliminate the disease from my flock. I did it largely by breeding up. I did what I had tried to do before, but I took more pains about it, and it is what we all should do, no matter what we are trying to breed, and that was, I selected the very best stock we had on the farm for breeding purposes; the very strongest. I know it is a temptation when it comes along about Thanksgiving time and turkeys are selling anywhere from twenty-five to thirty cents a pound, to sell off the best big turkeys, but if you do you are in the long run taking money out of your pocket-book. Those are the very ones which you want to use for breeding purposes, the big, strong, healthy, vigorous ones, that have been healthy and have the power to resist disease. I did not give those turkeys any medicine. I selected the very best birds, disinfected their runs with carbolic, and fed them where they could not get in contact with the germs, and in that way bred that disease out of the flock. Although they ran with the hens they did not go into the henhouse, but they came in contact with my hens on the farm and ran over the same ground, but they never have contracted the disease since. In my judgment, it is a question of vitality in the breeding stock, the ability to resist disease.

Now I have talked much longer than I ought to have talked. Are there any questions?

DISCUSSION.

The PRESIDENT. I think there are some in the audience who would like to get information on some of these points which you have brought out.

QUESTION. Tell us how we are going to get eggs at this time of year when they are selling for fifty to sixty cents.

MRS. ALLEN. I learned on consultation with the poultry papers that there are several different methods of keeping fowls or winter egg production. Of course, if there was just one right way, and we each of us have different circumstances and different breeds, with different environments to contend with, it is a little difficult for us to apply that to each individual case. As I told you, my henhouse violates all the "Don'ts" of poultry house onstruction, and some other problems which you perhaps may not have, but I can tell you about. In the first place, I am going to speak of that problem of feeding for winter eggs. Sometimes you hear people say not to give fowls any water. That is a mistake. So I am going to tell you to be sure to have water where your hens can get it, to have plenty of pure water where your fowls can find it easily. Really, I consider it of great importance in the production of winter eggs. Pure fresh water. Do not give your fowls any water which you would not drink yourself. Always give them pure water. That is a safe rule to follow, because a great many of the germ diseases which decimate flocks come from the use of impure water in the henhouse. So I say, first of all, give pure fresh water. Now I do not care whether you warm it or not. I have a suspicion, it may not be a certainty, that the hen rather have her drink cool. I know I would, and I think the hen is just like us human beings in that respect. I have put down two jars of water, one just warm and the other cold, and I found that the hen would go to the cold jar every time. Of course, in the basement of my henhouse water does not freeze, so I can use cold water in it. The temperature of the water does not make so much difference, but the purity and quantity of the water that you have does make a considerable difference. Always have it so that the hens can have some water. Then there are two or three other things that are essential to winter egg production. One of these is grits. I do not know what a hen does with grits. There was a discussion in the poultry papers about two years ago upon the question of what a hen does with the grits. Well, I do not know as it is essential for us to know absolutely what she does, but we know this, that she needs grits. Personally, I do not care whether she makes feathers or eggshells, but whatever she does she needs grits, and if you are going to be successful in getting winter eggs you must furnish grits. If you want to get the highest egg production you have got to feed your fowls grits. Oyster shell is good, or anything else of that character. If you neglect this, you will not get the highest production, and that is what you are working for when eggs are selling at from fifty to sixty cents a dozen. Of course, we all know that eggshells contain lime, and we must have lime for the hens in some manner.

And then there is another thing that is essential. If you are feeding your flock heavily, it is a good thing to have some charcoal about. Charcoal will correct many of the digestive ills which are liable to follow from the high feeding of fowls, and especially those which are confined. If they do not get the proper amount of exercise, digestive troubles are apt to come on and charcoal helps to ward these off. And, by the way, if you have weather like this in Connecticut you do not need to confine your fowls very much. I always let my fowls go outdoors if they want to. If they can go outdoors, I have always found that they will look around and get on the sunny side of a building for fresh air. Charcoal, grits, oyster shells, I keep in hoppers, so that they can help themselves. There is another thing which I keep in the hopper, and that is mash. I call it mash for the want of a better name, but it is a mixture of ground grain and beef scraps, which is recommended by the Maine experiment station. I have used it for several years. Perhaps most of you know about it. The formula is 200 lbs. of wheat bran, 100 lbs. of middlings, 100 lbs. of corn meal, 100 lbs. of gluten meal, and 100 lbs. of linseed oil meal, and 100 lbs. of good beef scrap. Now by good beef scrap I mean good beef scrap. I do not mean scrap that is only fit for fertilizer, and which is not fit for a respectable hen to put into her stomach. I think some of us are too careless about the way we feed our hens. We feed them too many times things which are not good for them. You take beef scrap, and if u feed scrap which is in a state of decay it simply causes sease, and if it does not cause disease to an extent sufficient make the birds sick, it still lowers their vitality and operates ainst them when the breeding and laying season comes on in e spring. I changed to dry mash. I used to feed a wet mash, t I found it was a lot of work to get it ready and there were me things about it that I did not like. Finally, I found a man 10 was getting about the same result from feeding dry mash d I changed over. There is a bulletin which is published by e Cornell Experiment Station, which any of you can get for e asking, showing some experiments which they made two or ree years ago with feeding fowls with different kinds of feed, ith dry mash and wet mash, and they found that the feeding of y mash, kept in a hopper before them all the time, produced e best result in eggs, and more eggs than were produced rough other methods.

I think there is one thing which I have not mentioned yet, d that is the grain. The grain I feed to my fowls in the litter. have the floor of my house covered with litter and then throw e grain in the litter and let them scratch. I keep the grain there r them all the time so that by simply going to work they can otain something to eat. A good many, I know, are pretty apt throw up their hands at the idea of giving a hen all she wants eat, because they say it makes them too fat, but where there is ie hen too fat to lay there are 999 hens that are too poor to lay. hey are sometimes so poor that they simply cannot produce n egg because they have not got the materials in their body to roduce it. A hen may be fat and not lay eggs. I do not believe is the hen's fault. I think it is the fault of the way in which she fed — because she is not fed an egg-producing ration; or it ay be that she is not of a breed which produces eggs prolifically. hat is one reason why farmers do not keep more thoroughbred ock. They cannot get the right stock because the fanciers pay ore attention to the production of feathers than to the production of eggs. I believe that the fanciers will have to breed for gg production as well as for feather production in order to have good market among the farmers. People often say that you ust feed a balanced ration for eggs; that is, that you must give o much of this and so much of the other. Well, I believe that a hen knows better what she needs than I do, and I simply give her a variety and let her make her own selection. I feed wheat, corn, buckwheat, barley and almost anything that will produce a variety, but there are two grains which I endeavor to keep before them all the time, and those are oats and wheat. Oats are a wonderful tonic for fowls, and there is something about them that will put cackle and egg-laying power into a hen just the same as they will put trot into a horse. They cannot digest oats in great quantities. There seems to be something about the hulls to the oats which makes it difficult for hens to digest them, but nevertheless those hens want some oats. The hen knows pretty well how many to eat. You watch them and you will find that they will eat a few every day. The other grain that I spoke of was wheat. It is a very nourishing grain. It is good for fowls, and, when wheat is fed, if the other conditions are right, there is usually no falling off in the egg production. For winter egg production I want some wheat.

Then there are some other things besides food which have a bearing on the question of producing winter eggs. Stock that is selected or bred for the production of winter eggs must be surrounded with the right conditions, and I mean by that good condition of the henhouse itself. Ventilation is an important consideration. The henhouse should be kept clean. Do not neglect that. Keep your henhouses clean. The hen is naturally a clean animal. Filthy henhouses will always lower the vitality of the flock and cause less egg production. I do not like to have a draft in the house and I do not believe that hens enjoy a cold draft any better than we do. We want to keep our hens from having drafts upon them and yet at the same time we want to keep them where they will have plenty of good fresh air. I have overcome that difficulty in a way. I suppose most of you have, and that is by the use of the muslin curtain system of ventilation. When I first began keeping fowls in that basement I found it was damp. I thought it would be doing the hens a good turn by building a fire, and so I put a stove in there, and began to run a fire for the benefit of the hen, thinking that by providing warm, comfortable accommodations for them I would increase my egg production. I found that those hens began to snuffle around pretty soon. They began to have colds and I found I could not ceep the fire there at night. In the daytime when I was up and round I could keep the fire all right, so that the temperature vould be all right, but I could not sit up all night with the flock or the sake of taking care of the fire, and the result was that vhile the house was warm and comfortable through the day it ooled off through the night, and there was too great a difference f temperature between the night and the day, and the fowls uffered in consequence. Yet if I did not have the fire the house vas damp, and I did not know what I was going to do until I ound that somebody had tried the use of a muslin curtain. And o I put muslin curtains on my henhouse and I never have had ny trouble since. I have plenty of fresh air, it stops the draft, t dries out the dampness, and the hens seem to be happy and ealthy with that kind of ventilation.

Now are there any questions?

QUESTION. You did not mention corn at all. Don't you feed ny corn to your chicks?

MRS. ALLEN. I think I said corn and buckwheat. I use some orn. If I left it out, I left it out unintentionally. I do feed some orn.

MR. COSGROVE. What do you feed your young chicks to start hem off with?

MRS. ALLEN. I feed oatmeal, rolled oatmeal. Not a bit of vheat.

MR. COSGROVE. What do you feed your young turkeys?

MRS. ALLEN. With my young turkeys I am afraid my reaching does not accord with my practice. For young turkeys preach the use of curd made from milk, separated from the vhey, not hard but very soft, but in running my farm I cannot lepend on that. The calves take the milk from the cows, so I lo not have the milk to give to the turkeys and I raise those on atmeal just as I do the chickens. I really think, however, that urd is a better food. I like the oatmeal because I have never had any bowel trouble with young chicks from the use of it. Of course, I do not feed for the first few hours at all; do not feed anything.

QUESTION. Is the oatmeal fed exclusively?

MRS. ALLEN. No, that is the first feed. Then as they begin to run about a little I keep a hopper that has some dry mash in it, such as I give to the hens, and let them help themselves. I put this in a feeder which I have manufactured myself. It is made so that the little chicks can eat undisturbed. As they grow older, I give them a little cracked corn and the dry mash feed, and I find that when I use it in this way they will never overeat.

QUESTION. What do you do for rats?

Mrs. ALLEN. I have but little trouble of that kind.

QUESTION. Do you use cement floors?

Mrs. ALLEN. I have tried three kinds of floors in the henhouse. The first was a dirt floor. There is no better for draining a henhouse than this, yet nevertheless, there is a certain dampness which will come up through the floor. That is not desirable. Then I tried the boards, but the rats came up through the boards and the boards were not so easy to clean. Finally I put in a floor of cement. A good many object to cement floors for henhouses, but really my experience is that if the floor is put in in a correct way and kept covered with litter, I believe there is no floor so good for the henhouse as one of that kind. By putting it in in the correct way, having it well drained underneath, it makes a floor which the rats cannot burrow through and makes a very warm floor for the henhouse. We probably have about a foot of stone under the cement floor, because in putting in the floor we had to dig quite deeply and we filled in with stone. Of course, three or four inches would make a good drainage. But with a good foundation of stone, and then putting in three or four inches of good Portland cement, made up one to seven of good sharp gravel and sand, makes a very good floor. We were putting it in the cow stable. We put down a layer of tarred paper and then painted that with common, ordinary coal tar, and then put on another layer of tarred paper. We put three layers under the cows in the barn, and then the cement on top of that. I should imagine about an inch and perhaps three-quarters of cement on top of that tarred paper. By using that you will cut off the possibility of any bit of dampness coming up from below, and you have an excellent floor which is warm. The heat will not be carried through the floor into the ground, and by covering it with litter and keeping it so that it is thoroughly covered with litter we have an ideal floor for a henhouse, to my mind. You do not have to replace it. It is there as long as you live. It nay cost a little more perhaps than the board floor in the first ·lace, but I doubt it, and it never has to be repaired. It stays here for life.

Question. Have you your chickens all in one house?

Mrs. Allen. I believe not. This year my husband is back ome, and I am going to try another plan. I think I shall start n with brooder houses which will keep about 200 in a house. t is not a good plan, I think, to have them all together.

Question. Mrs. Allen, will you kindly give us that formula or your mash again?

Mrs. Allen. Two hundred pounds of good wheat bran, 100 ounds of middlings, 100 pounds of linseed oil meal, 100 pounds f gluten meal, 100 pounds of good beef scrap, and corn meal.

Question. Don't you use any salt in your feed?

Mrs. Allen. No, because the salt will rattle down through he mash feed. Occasionally I give my fowls a treat which serves hat purpose. I cook up some potatoes or something of that kind nd salt them. There is one thing which is very essential, and hat is green stuff. Fowls needs some succulent food for the est production of winter eggs. It does not matter so much vhat it is. One year when I did not raise other things we had a ot of small potatoes which I cooked up for the hens, and I ound that they answered the purpose just about as well as to se cabbage or something of that kind. Something of that sort hould be given to fowls because it aids the digestion of the fowl. There are some things that I am going to try to do this year. Among other things I am going to try alfalfa. I believe there s no better green food for fowls. I believe I have got one of the est stands in the county, and if it winters through I am all right.

Question. Why was it that you lost so many turkeys?

Mrs. Allen. Well, I have explained that. It was due to the lisease that I spoke of, but I think I have overcome that trouble.

Question. Did their crops bloat at all?

Mrs. Allen. No. The symptoms, the more pronounced ymptoms are an enlargement of the intestines, and after a time he enlargement of the liver and yellow droppings.

Question. Did castor oil have any effect upon them whatever?

Mrs. ALLEN. Oh, yes, I saved a few, I am sorry to say. I had much better let them died.

QUESTION. Did it make any difference the quantity you gave them?

Mrs. ALLEN. I usually gave them enough. I usually started in with about a tablespoonful.

QUESTION. We found sometimes that their crops would bloat, and then the first thing you know their liver is upset, and there is nothing that will correct it.

Mrs. ALLEN. That is due to a packing in the crop. The disease that I speak of is simply and purely a germ disease. It is not caused by anything but a germ.

QUESTION. I would like to ask how old the chickens were when you began to feed that way?

Mrs. ALLEN. I just put it in their feeder. When the chicks come out they eat it just as soon as they come out. Little chicks, however, will not eat any very large quantities. They will stick to the oatmeal for about a month. Then they will begin to eat cracked corn and wet and dry mash, although I do not believe they grow quite so rapidly as those chicks that are fed on wet mash. They will mature quickly. I had pullets hatched about the 20th of April which were laying the last of October — Barred Plymouth Rocks.

A. MEMBER. I have used some bran at that time and rather like it.

Mrs. ALLEN. Of course, there is a good deal of bran in this mash.

QUESTION. In speaking of hens for laying, would you use salt?

Mrs. ALLEN. I did use salt as long as I fed them the wet mash, but I did not feed it to them in the dry mash. I did not notice any difference, but occasionally, as I said, I give the hens a treat by cooking up some potatoes and giving them that necessary element of their food in some such way.

QUESTION. Would you feed oats to young chicks?

Mrs. ALLEN. No. They can help themselves to them as soon as they begin to want them. I let my chicks and hens do a good deal as they want to.

QUESTION. Wouldn't they do better if you gave it to them?

Mrs. **Allen**. I have not thought so. Of course, I see that they are getting oatmeal, and look out to see that the older fowls do not get it away from them. But I am afraid I am taking up altogether too much time. I do not want to keep the floor all the afternoon.

Just in conclusion, do not forget to give your hens water. Keep them free from certain things, that is, avoid the three Ds, dirt, damp and drafts. Provide for the four Gs, grit, grain, greens and ground bone. On top of that, there should be a little bit of gumption on the part of the feeder. (Laughter.) That is another element which enters into success in the poultry business. If you avoid the three Ds and provide for the four Gs, then I am sure you will have success in the production of good poultry and good quantities of eggs.

The **President**. I think you are all ready to agree with me that it takes a woman to understand poultry and to run the poultry business. I think Mrs. Allen will agree with me that there are some men that know something about poultry and we have a few of them in Connecticut, I am proud to say, and one of them is the next speaker, Mr. W. H. Card, who is to favor us with a "chalk talk." I am going to ask that gentleman to take the platform without any further introduction.

FIRST DAY — EVENING SESSION.

Music.

Convention called to order at 8.15 p. m., Mr. George A. Cosgrove of Willington in the chair.

The PRESIDENT. I am the President of the State Poultry Association, and I am also a member of the State Board of Agriculture. Therefore, Mr. Lee, the President, has asked me if I would oblige him by taking charge of the meeting tonight. As I am of an obliging nature, I have consented to do so.

If you will kindly take seats up this way it will make it easier for the speaker. It is awfully hard for a speaker to speak over a whole lot of empty benches. If the State Board of Agriculture has anything to do, or is in any way the cause of this bountiful rain tonight, it is one of the best things the State Board of Agriculture ever did, for the State of Connecticut is awfully dry and needs rain sadly. Whether we are the cause of it or not, we are going to accept the honor of causing it all we can. (Laughter.)

Tonight we are to listen to a lecture by Professor Rettger of Yale College, who has been investigating for quite a long period of time the cause of one of the most fatal diseases that affect our young chicks. If that cause can be prevented it will result in a great saving to the poultry interests of the United States and will be a grand thing. I know that experiments have been conducted at Storrs under Professor Stoneburn, and they have sacrificed hundreds of young chicks in carrying out these experiments, and they have made good progress, but, I understand, if they have not already found the way to cure or prevent the terrible disease, they are on the road to that end. I have not listened to the lecture which is to be delivered tonight, and I do not know how far the speaker can go in saying what has been done to find a remedy, but I know that you will enjoy it, and I am sure it will be very instructive to the poultry keepers of the State.

We will now have the pleasure of listening to Dr. Rettger of Yale College.

FURTHER INVESTIGATION OF WHITE DIARRHEA IN CHICKS.

By Dr. L. P. Rettger, Sheffield Scientific School, New Haven.

Ladies and Gentlemen: I feel that half of my lecture has already been accomplished through what Mr. Cosgrove has said. I am particularly interested in three lines of agriculture from a scientific standpoint, and have been for a long time. One is the subject of soil fertility — namely, how can we restore to the soil the richness which the annual crops take from it. You remember in Victor Hugo's work "Les Miserables," he says, "We are pouring the richness of the land into the sea," and he wonders what will happen in the future when all the richness is poured into the sea. The subject of soil bacteria has been particularly interesting to me, because it answers the question of Hugo. Then the subject of dairying is one of prime importance and of interest to me. A large amount of scientific work has been done in connection with the dairy industry. I have been particularly interested in that phrase of it having to do with the public health, the study of scientific dairying, the study of the cow, and of methods to preserve the health of the cow, and for the production and preservation of pure milk. And then third, the subject of poultry diseases. There is a field that to me seems to be practically unexplored. It is a field which even those who are fairly well acquainted with the subject matter do not quite appreciate yet, I think, what there is to be known, and it seems to me that the field of animal diseases, and particularly poultry diseases, is one in which some good results are going to be obtained in the near future. If you take a few of the more important diseases like cholera, fowl tuberculosis, go over the list, we will find that, in fact, that there are very few of them that we know anything definite about, so far as the cause and cure is concerned. The two that I mentioned have been investigated more or less, and experiments have set us, so to speak, on the right track. But take many of the well-known ailments, such as roup, weak-leg and numerous other diseases, and particularly intestinal troubles of fowls, and we know very little indeed about them, and that applies particularly to bowel troubles of chickens. It has been about ten years since my attention was first directed to this subject of chick diseases. I must admit that during these entire ten years I was not constantly engaged in investigations, but I was anxious to get all sorts of material bearing upon the problem of what we knew about what we have come to call in the last few years white diarrhea. Ten years ago I did not understand the prominence of the disease. In fact, I thought it might occur here and there in an isolated way, among flocks of chicks that had been injured by cold or by superheating in the case of incubators or in brooders, but as the years went by I found I was working with something that had a very much wider horizon than I ever dreamed of, and today I feel that the time that we spend on the subject of white diarrhea is well spent. What we have done I shall try to put before you as a bacteriologist mostly, and Professor Stoneburn will give you the practical side of the problem.

Nearly all of you have had occasion to know what the seriousness of this disease is. I believe there is no poultry raiser in Connecticut, or no poultry raiser of any large number of chickens, but what has had his attention called to this scourge. Not only the poultry raiser on a large scale, but the chicken raiser who is raising for broilers and for his own use, the fancier, in fact, all have had something to do with this trouble. Now many investigators say that this disease occurs among incubator-hatched chicks; that we do not know of any cases where hen-hatched chicks have the disease. Therefore, there is something in the method of hatching incubator-hatched chicks that we must seek for in our investigations. Well, it is true to a large extent. I know that a large majority of the cases have occurred in artificially hatched chicks, but at the same time I know there are cases, and I know of a few cases of considerable prominence, where the chicks were not brooder chicks, or incubator-hatched, but were hen-hatched chicks. In fact, the original piece of work that I did on the subject was connected with something like seventeen hen-hatched chicks that were reared under outdoor conditions, the best conditions that I knew how to give them, but I must admit that the chicks were killed during wet weather, and perhaps that has something to do with the disease. I shall show you a little later on that the mere chilling or improper incubation, lack of ventilation, poor brooder facilities and many other causes are alleged for the presence of white diarrhea, but I shall also show you that these things are not the direct cause of the disease. In most every paper on the subject of poultry diseases we find reference to one or another of these alleged causes. Like carbonic acid. That was an alleged cause for some time, and is, to a certain extent, still urged Overheating, chilling of the chicks after they were hatched, and before they were hatched, and so on. In connection with the first epidemic of ten years ago I succeeded, after some difficulty, in obtaining fromthe blood of a chick an organism that has had my attention ever since. During these nine or ten years I have been at a loss to know what to call this bacteria which I thought at the time, and which I am now sure was the cause of that original epidemic among those seventeen chicks. Now I shall call that organism the bacterium pullorum. It may seem more or less arbitrary, but I have had advice from men who are skilled in this sort of thing, and have decided to call it the bacterium pullorum. I hope you will pardon me if during part of my address I may be just a little technical, going into what we call the bacteriological side of the subject, but you will appreciate, in fact, you must appreciate that if we are going to get anywhere in the work on this subject that part of the subject must be an important one. We must get at the cause of the disease. If we can study that cause in connection with the disease, and isolate from the victims of the disease, the cause, you will appreciate that we may in the end arrive at a remedy. I do not mean to say that we have an absolute remedy as yet.

Now this bacteria was found in the blood of these chicks nine or ten years ago. They were chicks about two weeks old when I first noticed the symptoms. I will refer to just a few of them. First of all I noticed a whitish diarrheal discharge of a more or less mucilaginous character. I at once called the disease a diarrheal disease, but I knew nothing about the bacillary character of white diarrhea at the time. I investigated the subject, in fact corresponded with authorities at Washington and others, and nobody there could inform me as to the disease I was working with, its name or anything else connected with it. That peculiar diarrheal condition was accompanied in every case by an extreme emaciation. The chicks became decidedly poor, weak and they were unable, as a rule, to eat. If they did eat, they mechanically went through the process of pecking at their food, but without much success. The weakness was progressive, and I noticed that they would fall against the wall of the coop they were in. They would lean up against that for support. When they got still weaker they would occasionally utter the peep, peep, peep which we recognized as a sign of distress, and give other signs of that nature. But what appealed to me particularly was the discharge from the intestines, the emaciation, and the extreme weakness. As time went on the same thing occurred, and a year after this first discovery of the epidemic I met with the disease at other places remote from that where it first occurred, and again among hen-hatched and not among incubator-hatched chicks. There were the same conditions involved in this case as in the others. The disease made itself known within a week or so after hatching. The symptoms were very much the same, and I succeeded, as I did before, in this attempt, but with less trouble, in isolating the organism that I had isolated the previous year from the blood of the liver, and also from the spleen in a few cases. I obtained it from the spleen once or twice. The disease was of such a character that I became satisfied that it was a septicemic blood infection. The next question before us was the prevalence of the disease. To what extent it might be found, the mortality and the question as to whether the symptoms corresponded in the different instances of its outbreak. I made another study, continued my investigations here and elsewhere, and found that the study was in its infancy. A year after that another epidemic occurred, and the organism was again found in the same way. The disease answered the same description, and I felt sure on those three occasions that I had exactly the same thing to deal with. The study of the organism itself, the bacteria, verified my conclusions. An examination of the chicks afflicted with this organism demonstrated that, and I have found it such a large number of times that I can now make a very brief test or examination and easily obtain a definite conclusion. At that time I did the work in the ordinary way, and tried all sorts of things, but did not have a practical working scheme. I would say to anyone who is interested in the investigation of white diarrhea from a bacteriological standpoint that the bacteria can be isolated in the following way. I will emphasize this again a little later. In the first if you open the chicken carefully, lay the chick on its back and open it carefully along the middle line, lay aside the skin flap and dissect down until you lay bare the surface of the liver or spleen, then make a small puncture with the scalpel or with the point of a pair of sharp scissors, and insert the surgical needle such as is usually used, running this into the lobe of the liver, and then withdraw it, you can usually obtain a sufficient amount of blood adhering to the end of the needle to permit the investigation. Then that is thoroughly dried and put into a regular incubator to await developments. In more recent years I have found this test was very satisfactory. Usually by the use of this method we can find in from twenty-four to thirty-six hours that the tube has a number of very fine specks upon the surface. You can hold it up and see them upon the surface. They are colorless. They are very small. They do not get large, and, in fact, they look and act almost as the erysipelas organism that we know so well now. That is a peculiar thing. There are usually very few of them. What you usually get are opaque. If there are any bacteria there at all you will have the indication whether you are on the right track or not. If you have no bacteria present that surface will remain unspotted. If you have something else present, some other organism aside from the organism of this chick disease, you will find a different sort of growth. The trouble in the past has been, I believe, that such examinations were made and the tubes were not scrutinized carefully enough, or else that the medium was such that the colonies were still smaller than those I have developed. I know in twenty-four hours some of these colonies, unless you hold a powerful lens over them, cannot be discovered. You actually have to do that, especially when you are examining the ovaries of the chickens or hens, or the organs of the fowl. Then, if you have encouraging results, the thing, of course, is to verify what you have done, or continue the diagnosis. We pour the medium into a tube which has been thoroughly sterilized, and pour into that a liquefied jelly with which we mix a little of this material, stir it or mix it thoroughly, and allow it to stand. Then after an incubation of from twenty-four to thirty-six hours we examine the plate and look for the same thing that we got on the surface of the tube. There again we found these very minute spots. Now not only do the colonies remain small like the condition which I have previously described, but there is something peculiar which the hand lens will not bring out. We have to place the culture under the power of a good microscope and examine the colonies one by one. It is not necessary for me to go into this branch of the subject at too great a length. The colonies remain small, but, as a rule, the whole plate is clear enough with them to use a hand lens to see them. Then we have used different tests, but there is no need of my going into that here. After all of this microscopic work to isolate the organism itself and to prove it as the same thing, the question then remained, what can you do with the organism when you have isolated it from a chick? What can you do with it in the way of producing the disease in question? That is a thing in which I have been interested from the first. Could I actually reproduce the disease by taking a pure organism and injecting it through a hypodermic needle under the skin? Could I do that so as to produce the disease just as I had seen the disease originally? Investigations to settle those questions were commenced. The results were at first failures because my chicks were too old. Then by the injection method, injecting under the skin directly was not satisfactory because most of the time I failed to either kill the chick or reproduce the disease, but after trying once or twice with young chicks the results were better. I found I could reproduce the disease at will, reproduce a disease typical in every respect. About four years ago I took up the work again in earnest because then I realized what it meant to the Connecticut farmer, and I realized how general what was called white diarrhea really was, and how important it was to Connecticut poultrymen that the disease should be conquered if possible. Investigation had shown how general it was, not only in Connecticut but all over New England, in Canada and in a big part of the west. The same disclosures were made in connection with these Connecticut epidemics which I had followed up. Annually I would be informed of two or three or four big epidemics, and in most cases, was able to investigate them. This went along until last spring when, through the assistance of my friends at Storrs, we were able to obtain chicks directly from the College for experimental purposes. In those chicks we found the same conditions as I have described them. I obtained the same organism, without any question whatever, from the ovaries and other internal organs, particularly liver, spleen, lungs and heart of the birds. I felt certain then that we were working with one organism, the organism that we had been working with all along, which when injected under the skin of young chickens would reproduce the disease in almost the same condition that we observed it in a natural epidemic. But here at once came an objection. The practical man would say, "Well, a chick don't naturally have bacteria injected under the skin. That would not be a natural method of infection." There is where the work rested until we took it up at Storrs last spring on a larger scale and in a decidedly practical way. The facilities at Storrs I found to be perfect for investigation. No expense was spared to provide us with brooders and eggs by the dozen, and with hens and chickens for experimental purposes. In fact, everything that we needed to do the work well. I was indeed happy for the opportunity. We undertook the investigation. In fact, we tried to verify everything from the first, but our main attention during this year has been directed to solving the question of the possibility of infection through the food supply, and not through the skin. There is a question which we said would be uppermost in everybody's mind. Is this infection produced by infected food or does the chick acquire the infection by picking up the droppings of other infected birds, or is there any other way of infection such as infection brought about long before the chick is hatched from the egg?

Now I will go back to the question of infection from the food supply. We started with one lot of chicks, several lots rather, of chicks hatched at the same time. They were divided into several pens. We experimented with these for some time, but the results were negative. Of course, we thought that we must have done the work improperly, but upon looking over our data thoroughly we came to the conclusion that we had not given a fair chance for the bacteria to work because we had taken chicks that were too old when we began to infect them with the food supply. If we took chicks one or two days old and not three days old we might have succeeded. We naturally tried the thing over, this time paying attention to the age. We took them out of the incubator, before they were scarcely dry and infected them by putting a water suspension of this organism down the throat of the chick with a little medicine dropper, and then after that fed them two or three times daily with food that was infected with the organism. We succeeded in reproducing the disease, particularly in one of the three lots, probably in a second lot, but we were not so sure of that. But in the one lot we felt confident that the organism that we had fed the chicks was the organism which was reproducing this white diarrhea. Then we took three lots of chicks and infected them with the organism at three different times, at three different dates over two years apart, A, B and D. A was two years old. B was almost two years. D was this summer's isolation. The D lot was the successful lot that responded to the treatment, or to the infection. Now why? We know that in fowl cholera, or in typhoid fever in man, if the disease bacillus, or whatever it is, is isolated and kept away from that body that it has made the victim for any length of time it loses its original power to produce the disease. The cause then of those few variations in the results was not then far to find. D was a comparatively fresh organism. A and B were not able to do the work. In the next experiments we tried in this way: in one case we used germs that were isolated from chicks that came from Storrs, D-2, D-3 and D-4. They were isolated at different times — D-2 from fresh eggs, D-3 from hen-hatched chicks and D-4 from one of the ova of an infected hen. In that order also we had the age taken into consideration. D was the oldest, D-2 was younger, D-3 was still younger and D-4 younger still. When we came to the results we found that D-4 killed over sixty per cent., D-3 several and D-2 a few, if any. In the infected lot the mortality was far below what it ordinarily is when you are trying to raise chicks, but we felt encouraged in our effort to reproduce the disease by the infection method. We are still going on with the work, and intend to devote the next summer to making ourselves proof against any criticism of our methods. Proof of results by duplication of the work is necessary in any kind of work of this sort. We feel, however, satisfied upon one thing, that the disease may be transmitted from chick to chick during the first few days, and is readily carried from one to another during the first twenty-four hours after the chick leaves the egg. It does not take but a moment to appreciate that. Newly hatched chicks are running about pecking at everything. The droppings of infected chicks are picked up just as any food material would be, and these young chicks are infecting themselves long before they are having any food within their stomachs, and that is the fact, that seem to be one of the great dangers in the transmission of the disease.

Now I will hurry with the rest. The question as to the source of white diarrhea naturally comes to the fore. At one time there was a large lot of eggs incubated of whichc a large number failed to hatch. I requested that they send me such eggs, and they sent me fifteen dozen at one time. I was overwhelmed with work, but I succeeded in examining a few of these. Out of those eggs I found eight of them infected with the bacterium pullorum. The infection was in the yolk. Out of the seven and one-half dozen eggs, we, therefore, found a certain number that were known to contain the bacterium pullorum in large numbers. That was encouraging, because we saw that we were getting back nearer to the source of the thing. We examined the shells and failed to find any indication whatever of the organism being on the shell. We thought they might be deposited on the shell, but the result of the investigation was altogether negative. Those eight eggs where we found the organism in the yolk were unhatched yolks, yolks that were not fully developed, not of full size. The organism was found in eight of those yolks, or recovered from the yolk of eight of those eggs that had failed to hatch, or that were taken out of the incubator because they were known to be defective or dead. We soon after that had several fresh eggs. There was not but a few dozen, if I remember, rightly, and I succeeded in finding the same conditions again that I have just spoken of in connection with the incubator dead yolks, namely, we found infection of the yolk of fresh eggs, not of the yolk I should say, but infection within the ventilation membrane, and the organism was again found in considerable number. We seemed to be still getting further back to the hen. Those had come from Rhode Island Red hens that the owner had prepared for market. He asked me to come up there, saying that we would work over those Red hens and see what we could evolve. We had not gone very far with the examination of the hens before we found right after they were killed that out of twenty-three hens twenty-one had decidedly abnormal ovaries. These were old Rhode Island hens. I think two or three years old. And we found eight infected decidedly abnormal ovaries. These were old Rhode Island hens, that had laid these fresh eggs contained this bacteria. Now twenty-one of the twenty-three hens that we examined had decidedly pathological ovaries. Some of the ovaries were almost black, some a greenish black, some orange colored, some light, and some as hard as hard cheese, of all grades of constituency, and the shape of the ovaries was varied too. Sometimes they were almost like a square block of wood. They were perfectly abnormal pathologically. Then we made an examination from them, as I have described in connection with the chicks, and found that out of twenty hens that we examined there were nine had ovas infected with the bacterium pullorum. That is, we found in those ovas of nine hens the bacterium pullorum. Now I will stake my life on it that we were not misled. Thus you can see that brings it back pretty near to the source. The question then arose where does the hen get the organism? Just as a child carries the tuberculosis germ somewhere in its system in a sort of dormant state, so does the hen carry the germ of this disease, and in that way carries the seed of mortality which may be transmitted to her chicks. How does the hen get the organism, and whether through feeding or through the water supply, or through picking up infected material in the poultry yard, or how else may the hen get the organism? These are questions which it seems to me must be worked out if possible.

Now to sum up briefly, I would say that this organism that we call the bacterium pullorum is found in chicks which have all the symptoms of white diarrhea, and as we have known the disease. I know we have some who do not agree with us. But

I shall not discuss that question. I would say this, however, that the infection may be brought about through the food, if the food is infected, or the yolks within the first two days after hatching; that the infection probably, in many cases at least, is brought about in the incubator where there is no segregation of the chicks, and where the chicks are allowed to run with forty or fifty others in one incubator. One chick having the disease among a lot of fifty can be the beginning of the scourge, and the cause for an epidemic, just as one case of typhoid may cause an epidemic among the human species.

Then the infection is found in the hen itself, and therefore particular attention must be paid to breeding stock, to get a healthy condition among the hens, and in that way eradicate or avoid the disease as much as possible. I believe there is the secret of the prevention, and as we have worked along, that has been borne in upon me more and more. I have no doubt that many so-called poor laying hens have pathological ovaries, but in many cases the presence of this organism makes them pathologic along with other conditions, of course; that the hens are responsible for the infection of the eggs; that the eggs are infected, and then the infection is carried down, the infection within the yolk remains there until the chick develops and the chick itself absorbs the infection. If that be possible, and that is only an assumption, I can see that the yolk is directly responsible for the infection. Now during the incubation period the organism is absorbed with the yolk itself by the chick, because we know the organism is in the chick, and it is in the blood of the chick, and we know that it is the very organism which produces symptoms of the white diarrhea.

I need not give you any method of prevention beyond what I have already hinted at, but I think the suggestion of possibly better care along certain lines will be uppermost in your minds, so as to prevent using infected hens for one thing, infected eggs for another, and the infection of the incubator for another, so as to prevent the infection from the yolk to the chick during the incubation period.

I thank you.

The PRESIDENT. I think the farmer who lives in this age is to be congratulated upon the fact that educated men are willing to spend their time for years in patient investigation of these cases of disease which we never used to know anything about at all, which are so difficult to find out about, and which occasion such great losses. It is a matter of great congratulation. The farmer ought to be thankful, and he ought to honor these men who are willing to spend their time to see if they cannot find some way to get rid of some of these causes of loss. Now a few men have not realized the immense value of the agricultural interests of the country. They do not think of the values produced, and they do not think how dependent a great many people are upon the farmer's success. How long would a city like this live if the farmer was entirely wiped out? How long would the city live? It could not live for a week. We are entirely dependent upon them. Our business prosperity is dependent upon them. Take this one thing of our corn crop during the last year of 1909. According to the agricultural department, our crop of corn is valued at one billion seven hundred and twenty-four million. It was raised out of the earth in about one hundred and twenty days. That crop added fourteen million dollars a day to the wealth of this country. Fourteen millions for every day. Just think of the values that are being produced. How dependent we are upon that. I should like to have time to dwell upon it, but cannot dwell upon such matters now. It seems to me we should be gratified by the fact that men are willing to devote their time to finding out the cause and prevention of so many of these things which occasion us farmers great loss.

Now we would like to have this splendid address by Professor Rettger supplemented by what Professor Stoneburn has to say upon the same subject.

Professor STONEBURN. Mr. Chairman and Gentlemen: Dr. Rettger has stated that in this investigation we have possibly trespassed upon the territory of someone else; that other people are taking up the investigation of this subject and that we have walked on their toes. Now Dr. Rettger is too modest. That is not true. Dr. Rettger is the Christopher Columbus of this white diarrhea investigation. He was the first man to land. There are people who do not care what Dr. Rettger may find as long as they get the credit. Are we to understand that Dr. Rettger is wrong, or that the people whom I have mentioned are wrong? Not necessarily. I think it is entirely possible that there are diseases or troubles that are closely allied to the disease which we have been talking about, and many uniform symptoms that possibly might be termed white diarrhea that are caused by different organisms. Now I do not want to be quoted as saying that that is true. I simply admit the possibility and I believe Dr. Rettger does. I feel, however, that Dr. Rettger's claim to the discovery of the germ of this disease that is known among the poultrymen of New England anyway as the white diarrhea is fully established.

I want to ask how many poultry-keepers here have had this disease in their flocks, or who have had young chicks diseased with a disease that they considered white diarrhea. Please stick up your hand and let me know. Well, I see there are some victims.

Now I am going to read a list of the symptoms of this disease as we have observed it, and I want you to tell me frankly whether or not these symptoms accord with the symptoms that you have observed in your own flocks. In the cases of the disease where we have been able to reproduce it, we have always observed these symptoms. I mean they come with a fair degree of uniformity. Now I am going to read these symptoms and I want you to break in at any time and say, "That is the way it goes with me, or, "That is not the way it goes," because what we need is your co-operation at this time. We want to know that we are really working with the disease that you know as the white diarrhea. Death may occur within a very short time after hatching without any prominent symptoms except weakness and lack of vitality. You go to your brooder in a day or two after the chicks are hatched, and you will find one or two little fellows dead. The characteristic whitish discharge from the vent soon makes its appearance in the flock, the time depending without doubt upon the virulence of the organism and the mode of infection. The discharge may be slight or profuse; in color white or creamy, sometimes mixed with brown. The voided matter is more or less sticky or of glairy character. It may simply streak down below the vent or may cling to the down in sufficient quantity to seal up the vent. This is the condition that poultrymen designate as "pasting up behind." The chicks soon become listless and sleepy, inclined to huddle together and remain under the hover much of the time. They do not seem inclined to get out into the sunlight, but are inclined to get back under the hover. They seem to lose appetite and do not eat much. Frequently when they attempt take food their action is more or less mechanical. They seem want something to eat, but apparently cannot bring it about. hey will peck at a morsel of food three or four times before ey pick it up. The wings begin to droop or project slightly om the body, with the feathers rather ruffled. In acute cases e eyes are closed and the chicks become indifferent to every-ing that goes on about them. Many of the chicks peep or chirp nstantly, the sound being shrill or weak according to the rength of the individual. You hear them going peep, peep, ep, around the brooder. They make that sound probably cause they are in pain. Frequently when endeavoring to void e excreta the chick utters a shrill twitter, apparently a sound pain. The breathing may be labored, the abdomen heaving ith each breath. During the progress of the disease the chicks ay die suddenly while still fairly strong, but in most cases they gin to grow weaker and weaker until they are scarcely able support their own weight. In this state they are frequently be seen to rest against objects for support, standing with legs aced apart, squatting or lying utterly helpless. Undoubtedly, me of you have had this trouble in your flocks, have picked a chick in that condition and found that there was still some e in it. Frequently the chicks take on the appearance which ultrymen call "short backed." The back seems to shorten and e abdomen to protrude out of proportion, causing the chick look stilty as compared with one of normal development.

Are those the symptoms of the disease as you know it? nyone any objection to that? Does anybody disagree with at or does anybody object to that description of the mptoms? We want to know whether the poultrymen of nnecticut regard this as the disease that we are working on.

A Member. A great many times, Mr. President, I have ticed they have all of these symptoms that the Professor s read.

Professor Stoneburn. Occasionally you will find individuals at do not show the same character of excreta, but some of it more or less mixed with brown. Frequently the droppings do t accumulate at all upon the fluff. It is a satisfaction to me to e that those symptoms meet the understanding of those present what the white diarrhea is, and that that is the type of the disease that Dr. Rettger and others are working upon, and what he has called the bacillary white diarrhea as distinguishing it from other possible forms of the disease.

Now how many of you think it is worth while after a chick has died to cut it open and try to find out what happened to it? (A few hands raised.) I think there should be more. I think if you would take a little more interest in that you would learn quite a little. Now the post-mortem appearance of chicks that die of this disease are about as follows: the crop empty or partially filled with slimy fluid or with food. The kind of slimy fluid differs slightly and frequently the crop when full you will find some of that sticky fluid substance in it. Sometimes it will pour from the mouth, and there may be some from the lungs. The lungs are usually found normal. The liver is usually found pale with streaks or patches of red. These apparently slightly congested areas are usually large in size. The kidneys and spleen apparently normal. The intestines pale and for the great part empty. A small amount of dark grayish or brownish matter frequently present. Ceca usually filled with a grayish soft material. Only occasionally do we find the ceca filled with a cheesy or firm material. Dr. Morse states that that is always true of white diarrhea.

Unabsorbed yolk is usually present, varying in size from a pea to a full sized yolk. The color may vary from yellow to brownish green, or nearly black. In consistency there is also much variation. It may appear perfectly normal, distinctly gelatinous or watery. Frequently it is observed in the character of custard, and again more or less dry and firm. Unless the chick has been dead for some time, the yolk is usually not found putrid, but merely stale. The word stale expresses the smell. The chick as a whole appears more or less anaemic and emaciated. The muscles of the wings, breast and legs may be almost completely wasted away. Those are the appearances.

Now what does our work amount to? I wish to say that the work has been conscientious. We have done our best. We have not been trying to make any record, but I wish to say that the results that we give you are actually what we secured in our work. Every man who has been connected with it has been conscientious, I believe. During the latter part of the experiments Mr. Stephenson, who addressed you this morning, has had charge of the chicks. Right at this time I want to express publicly my appreciation of the hearty interest and enthusiasm which we received from the Experiment Station. When the matter was first brought to Professor Clinton's attention it was understood that it might be somewhat expensive, and that we might possibly need a great many chicks; that we would require certain equipment. We had to have more or less material constantly, because if these results are to mean anything they must be secured from a fair number of chicks, and not from a half dozen. As we intended to kill as many of these chicks as we could they knew they would not be available for the market, yet Dr. Clinton heartily and enthusiastically backed the proposition, and helped it in every way in his power. If it has been possible for Dr. Rettger to do anything since the making of these arrangements, I think they are due in large part to Professor Clinton.

Now Dr. Rettger has told you that we have found the organism first in chicks that died from a disease that we consider white diarrhea. Secondly, he has found it in the embryo, in the egg. Third, he has found it in the yolk of fresh eggs and finally in the ovary of the hen. Now it seems to me that that is a pretty complete list, and that we can follow it right straight back to the fowl itself.

QUESTION. Did you examine the roosters?

Professor STONEBURN. Yes, with a negative result. In other words, friends, if you have got bacillary white diarrhea you can make up your minds that the disease is not due, as Dr. Rettger has said, to poor incubation, poor birds or poor feeding, but it is due to the infection of this specific organism. The organism may make greater headway in chicks which have been weakened by any one of these things. I mean if you so carry on your operations with your poultry that you produce chicks that are weak they are more likely to contract the disease, and further, to die from the disease, than are strong chicks, even though the strong chicks are infected. On every infected farm a certain percentage of your chicks are hatched with the disease, and from that you can expect a continuous performance of trouble. It will be bad right along.

Wherever we have injected the pure organism under the skin we have had one hundred per cent. of mortality. Every chick has died. Where we fed the organism to chicks over three days of age we have been unable to produce the disease, but I think in every case where we have fed the organism — I do not mean in every individual case, I am talking about flocks of an average of fifty — I think in every case where the chicks have been under forty-eight hours of age we have produced the disease in certainly a large number of cases. I said a moment ago that these results would mean nothing if they had been secured from experiments with merely a few chicks. We wanted to have a wholesale experimentation in order that we might say that the experiments were reliable, and not merely laboratory tests upon two or three chicks. We took 198, we took 396 chicks all of the same age, and hatched from eggs secured from the same farm, hatched at the same time and in the same incubator. They were divided into equal lots and placed in exactly the same sort of brooders. Up to five weeks of age from the 198 chicks in the non-infected, or, as we say, controlled, lot, the chicks that we gave our usual care, the loss was twenty-seven chicks, and that was in the month of August. In other words, about thirteen per cent. of loss in five weeks. You do about that right along. In the infected lot in the same time we lost seventy-nine chicks. Twenty-seven in the controlled lot and seventy-nine in the infected lot. Now that does not tell the whole story by any means. The chicks that managed to survive in the infected lot were distinctly inferior to those in the controlled lot. They weighed fifteen per cent. less, were not feathered as well and gave the appearance of being mighty poor stock. These chicks were cared for in outdoor brooders of our own design and which were real outdoor brooder houses and not little temporary brooder houses.

Now I am going to take three lots, in order to make this as strict as possible, and I am going to take the results from the two that gave the largest mortality. We had two chick lots. We put forty-two chicks in each pen in the brooder house. I want to say again that these chicks came from one farm, were of one variety, were hatched in the same incubator and at the same time, and were divided equally from one incubator into different pens. If we could make them any more uniform I would like to know how. We tried to make the chicks exactly alike. Now, as I say, we divided them into two pens. In pen No. 2 we fed the organism as we secured it from fresh eggs. In pen No. 3 we fed the organism as we secured it from the ovary of the hens. In pen No. 5 and pen No. 6 we simply gave our chicks good care. The result in five weeks was that we lost in our two chick lots nine chicks; from our infected lot of eighty-four chicks we lost fifty-one. Nine as against fifty-one. Isn't that proof enough that we have an organism that is causing some trouble? I have had lots of people come there and have invariably asked them to pick out the healthy pen and the infected pen, and I do not care who it was, every individual could pick out the infected chicks because there was such a marked difference between them and the others.

Now what more are we going to do? We are going to try our best to find a method of prevention and method to cure. I think Dr. Rettger has more confidence in our ability to prevent the disease than in our ability to cure it, if once it sets in. There are several points that the Doctor brought out as means of prevention that I want to elaborate. In the first place, the original source of infection is the hen. And the only thing to do is to get rid of the hen that is giving you infected eggs. One of the best ways to do is to mark your chicks from different hens. I do not think it is any very difficult thing to mark chicks from different hens. If you find that pen No. 1 is giving you good strong chicks and pen No. 2 is giving you chicks that have the disease, I would eliminate that pen No. 2. But suppose your birds are extremely valuable, and you see that in pen No. 2 there s a possibility of the disease only coming from one or two hens. It becomes a question then what to do. If the birds are worth while you can install divisions of the pen and find out which hen s giving you the infected chicks.

Next be careful about the chicks in the incubator at the time of hatching. You all have to watch your incubator more or less, and you know as soon as the chicks come out of the eggs and begin to run around a little they peck at each other and at the droppings about the incubator, and this one infected chick, as the Doctor says, may cause the whole brood to contract the disease. It seems to me that it might be wise then for us to use in our incubator the so-called trays, or something that will break newly hatched chicks up into small groups rather than to a them to run together as an entire lot. Now that means prob that you have got to keep your chicks away from each o until they are about two days of age, but most of us keep chicks in that long anyway, so that is not a difficult matter.

The PRESIDENT. Now are there any questions?

QUESTION. If you were raising chicks and had perhaps per cent. of your chickens in that condition, would you kill t in order to stamp out the disease?

Professor STONEBURN. Well, perhaps that is the lo thing to do, but I am afraid a good many would not want t that. The trouble lies that most of us have not got our n with us when it comes to handling the chick.

QUESTION. The natural thing, of course, is for a ma save as many as he can, but I should say if you were to cure of them it is likely to be diseased all its life.

Professor STONEBURN. That is a thing we are going to k this spring.

Now Dr. Rettger is particularly anxious to receive rep of outbreaks of the white diarrhea, so-called. If you ar unfortunate next spring as to find your chicks diseased wi disease which you consider to be this white diarrhea, I wish would let Dr. Rettger, whom you can address care of Sheffield Scientific School, New Haven, or myself at St know about it. It is possible that we may be able to visit but if not, we may be able to get some information from you, possibly give you some information as our work develops.

Now, Mr. Chairman, there are one or two little matter connection with the work of the poultry department at the col that I want to speak of.

First, in regard to this matter of our poultry courses. It been customary since '92 to give a short poultry course du the winter. Our regular short course begins January 4th runs six weeks to February 11th. It is a course devoted enti to poultry raising and horticulture. At my request, Profe Gulley has kindly consented to give us considerable work horticulture and, in my opinion, in the future we are going see the combination worked out more than it has been. We going to get two crops from one piece of land if we can. The work this winter with poultry and horticulture, so far as our equipment will let us, will be made as practical as possible. The work will be devoted to giving practical instruction, and those who take the course, just as far as possible, will be taught poultry keeping by doing rather than saying, but I regret to say that our equipment is not sufficient to do all that we would like, but we are going to do the best that we know how. The entire cost of that course need not exceed $40.

There are three lots of people who, in our experience, we find like to take this course in poultry raising — school teachers, business people and professional people; and in order to accommodate those we are offering a summer course which will open after the close of the regular term and continue so as to give us four school weeks. That course was given last year at Storrs and was very successful. It was attended by a large number. That course will be repeated this year and I want to say to such of you that have not been at Storrs in the summer that it is a most delightful place and, if you can arrange it, it makes a very pleasant place to spend a part of one's vacation in a very practical way.

I would like to say further, Mr. President, that there is a bulletin on the press setting forth the discoveries of Dr. Rettger, and such of you as are on the Station mailing list will receive copies directly. If you are not receiving it usually, drop a card and I will see that a copy reaches you forthwith. I am sorry that the bulletin has not been printed in time for general distribution here. Only a very few copies have been printed.

The PRESIDENT. I am sure we have all been very much interested in these very instructive addresses which have been given to us by Dr. Rettger and Professor Stoneburn. We are to have another, however, by Dr. C. F. Hodge of Clark University, on "Game Birds under Domestication." It was a lecture which interested me a great deal when I heard it last July at our field day at Storrs College. The lecture contains a great deal of interesting and useful information for the farmer with reference to the importance of preserving game birds and our native birds, so as to destroy our insect pests. I presume Professor Hodge will tell us how many bugs one of those little birds that he is going to talk about will devour in the course of a day, and yo can see how beneficial to agriculture the cultivation of birds is.

Dr. C. F. HODGE. Mr. Chairman, Ladies and Gentlemen: believe my excuse for being here arises from the fact that in government bulletin entitled, "The Bobwhite or Quail," fo which I am in part responsible, the statement is made that prob ably no form of poultry culture would be so profitable as th rearing of the bobwhite. That statement I have sustained, an I wish to illustrate it somewhat by the examinations that I hav been trying to make. But in seeking to understand the questio from my point of view I will ask you to take a brief excursio into another but related field and seek the motive underlying th purposes of us biologists. I am going from here down to th American Ornithological Society meeting to discuss some of th forms found on this continent. The purpose of that society i part is the preservation and protection of our bird life, and w want to have everybody take part in that work. We must, in fac have everybody take part if this form of life, which is so essenti to the agriculture of this country, is not going to be exterminate and make a desert of the American continent. You get the ide The effort in the past to domesticate animals and birds has mea a great deal and will mean a great deal more for the race an for us as Americans in our highly organized life, and that i the kind of work that we are trying to carry on all over th country. If we ask the question whether it is worth while or no all we have to remember is that it is estimated that these littl birds alone such as you see here (indicating) devour twenty-on thousand bushels of insects every day. If each one of thes devoured only fifteen insects per day that will take six hundre insects a day, and I can tell you about some more of them, bu it is estimated that these birds alone consume eighty-six thousan bushels a day. The ravages from insects on our agricultur crops is something tremendous. We need a great many mor birds than we have because we know that from very low esti mates the loss from insects imposed upon the farmer and upo the consumer of agricultural products amounts to nearly on billion of dollars a year, or almost one-seventh of the total valu of our agricultural crops destroyed by insects. Nothing make a pet which the children are interested in more than birds. I lik to have the little folks doing something with living things, and it is a splendid thing to give them a garden, to let them watch things growing in the garden, to give them something to take care of and love. I wish that every little boy and girl in the country was taking good care of some chickens. It gives them something to take up their attention, gives them outdoor exercise, and when they get up and have little folks of their own there will not be such an amount of infant mortality as we have now. We bring up our children and they do not have anything to take care of and all at once they do not know what to with themselves. We need to bring these things into their lives more.

Now with reference to our game birds, we have very foolishly exterminated, particularly here in New England, or practically exterminated some of the finest game species that we had. Many of them are gone from our New England hills never to return. I want to see game laws arranged for in the different states and a good strong movement initiated for more game and for the preservation of game. That movement is already under way. It is now being advocated and pushed and in many cases is meeting with strong public approval. We need more game and particularly more game birds. That is what we must have or we shall continue to have the barren wilderness that we have now. As a matter of fact, now, a great many farmers do not want any game on their land because they fear it will be over-run. In that way, the game has been depleted, but we need to right-about-face and to have laws which will protect the farmer absolutely and give him a proper return for the game that he raises. We can have a country full of game with the proper kind of legislation and without many of the evils which the farmers have complained of. Take our wild geese and swans and our wild ducks. The last remaining strongholds of these birds up in Canada are now being opened to settlement and unless we can attract them and cause them to breed nearer the habitations of men the species will become extinct. We must bring them back and have them breed about our brooks and streams, or they will disappear from the continent. Their last strongholds are now being attacked. Here is a mallard duck. We are beginning to attract them quite often. They now are nesting about New England. The wood duck also needs very careful protection.

This slide shows the prairie chicken. The prairie chicke as most of you know, has been rapidly depleted. They are beir exterminated and have been very largely so in the last few year I am glad to say, however, that they are now being carefull protected in most of the western states where they thrive. used to hear them boom on the prairies in Wisconsin. I woul raise them now here if I could. To me that boom makes th finest natural music that I know. I came within one of getting fine stock of prairie chickens to begin experiments with fro Illinois, and the person from whom I was to obtain them se them, but they died. Next year I think we will be pretty sure start them.

Here is another thing. This shows our native passenge pigeon or the wild pigeon of the woods. It is a disgrace th way that race of birds has been exterminated. Most of ou ornithologists claim that this bird is entirely extinct. Most o them say there is not a wild specimen of the old-fashioned blu pigeon alive on the American continent today. I am going dow to the Ornithological Union and I expect to present before tha body something with reference to the problem of reviving th passenger pigeon in America. I think the fault is largely with u who take an interest in game birds. These birds were ruthlessl slaughtered and we ought to have given the warning when peopl were driving the hogs to feed on the pigeons and birds that wer killed at their roosting places. I am not quite so sure as som others I know that the bird is entirely extinct. We used to hea occasionally of a few being seen here and there. I rather fee that there may be some yet. There is just one pair in the Cincinnati Zoo, one pair of old birds remaining that have been in captivity for a good while and that are now sterile. So unless w can find some little flock breeding somewhere the species is gone I would like to ask if any of you here have seen within the las summer any of these birds, so that you can be sure of them I saw a flock a year ago last September, and I have reports tha are fairly reliable of some being seen only this present October If any of you discover any of these birds, I hope that they wil be given absolute protection.

One of our finest game birds is the ruffed grouse or partridge It has differing names in different localities. Perhaps I will cal it the partridge. Further south they call it the ruffed grouse.

But it is one of the finest game birds that we have in the woods. I have been trying to domesticate them and rear them. I have been at it for seven years and this slide shows some of them that I reared. They are fed very largely on wild fruit in the season.

This slide represents a mistake that I made. I found that we could rear these birds very nicely up to five or six years of age, and then they got some kind of a germ disease and died. We had succeeded in raising some, but we took them away, and hen they went on until they arrived at about that age, when they died. I do not know whether it is anything in the nature of the white diarrhea infection or not, but a good many of them had symptoms of the pasted behind, short back, drooping wings, etc. We have a number of diseases in connection with these birds to deal with and it is rather more difficult to rear wild birds than ame poultry on that account. I trust that we shall have some help eventually from men like Dr. Rettger and Professor Stoneburn in clearing away the matter of disease or infection from hese birds while being domesticated. That is the only thing that prevents the rearing of these birds in any quantity. We have en going on the theory that we have got the infection from hens. I have given up definitely trying to raise partridge or quail with the hen only when we can have eggs that are uninfected. It is the same with the blackhead in turkeys. We are trying to breed chickens by raising them in new incubators, using eggs from carefully selected stock, so as to raise birds to be the mothers of generations of these wild birds.

Some of the antics of these birds are very interesting and amusing. This picture shows the little hen trying to strut herself. She does it pretty well, just as a young turkey hen in the fall. These birds particularly are very useful about the place in the way of destroying bugs, June bugs, squash bugs, cucumber beetles, cabbage worms, Hessian flies, injurious bugs and insects of that kind. Quail in particular will devour them in large quantities. In fact, they can be of service to agriculture to a very great extent. They do very little harm. A partridge does do some harm, but the quail does not. Let me tell you a story in connection with that first pair that I was telling you about. I was busy otherwise and paid very little attention to them, but the little quail did not lay, and I said to my little daughter, who had made a pet of the quail, " Perhaps if you were to feed that little bird more insects it would lay. I will tell you what I wi do. If you will feed it all the rose slugs that she can eat I wi give you a dollar." So she went at it. She had never been t school a day in her life, but she developed her own method. thought she would catch the rose bugs and then pour them dow in front of the quail, but no, she had her own method. She bega by simply counting into a tumbler and when she got enough sh went and fed them to the quail. Well, the result was 1,286 ros slugs eaten by one little hen quail. That gives you an idea of th possibility of these birds as insect destroyers. I am positive, jus as positive as that I am alive, that we could have enough of thes bird about the farms if we were to take a little pains to domest cate and care for them, to make our bill for insect damage loo like thirty cents. I am sure of it. It is a matter of insects. we had the sense to rear them for what they could do in savin insect damage, and clearing up our roadsides and weedy corners we could undoubtedly save to the people of the United State every year, by just utilizing that one bird, an enormous amount o money. A couple of years ago at one of the meetings of th American Ornithological Society, Dr. Palmer told me this stor "While I was out in Illinois I heard this story. A farmer told to me. Some men came along and shot a quail. The farme said, 'Well, boys, I don't like to have you shoot the birds on m place; I would a good deal rather you would go into the barnyar and shoot one of my cows. I have lived on the farm and I hav seen her devour so many bugs that I know that she was one o the best servants I had.'" This same little quail that I was talkin to you about a few minutes ago, in this same flock, ate 868 mos quitoes in two hours. We have made tests and discovered tha a large number of Hessian flies were also consumed.

This slide shows the cock hatching eggs. He is a very usefu bird. The cock in this case was sitting on the nest hatching th eggs and the hen went over to the other side of the enclosur and started another nest. My quail averaged sixty-five egg apiece that year. The hens are very industrious layers, and i they can induce the cock to do the breeding and help bring u the young, why isn't it a good arrangement?

The President. That concludes our program for today, an the meeting will stand adjourned.

SECOND DAY.

Morning Session.

Music.

Convention called to order at 10:10 A. M., Vice-President Lee in the chair.

The **President.** It is a very important question, to my mind, that we have before us this morning. Perhaps I can appreciate it more than many of you can. I spent a few weeks on the other side of the water this summer, and all through Scotland and England it was not only with great interest but with great pleasure that I noted the large number of sheep that the farmers had over there. The gentleman who is to be the first speaker today is to speak on " The Re-establishment of Sheep Husbandry in Connecticut."

Question. Do they have any dogs over there?

The **President.** I suppose all you are thinking about is dogs in connection with the sheep industry. In England and Scotland they seem to have solved that question, or, at least, largely so. The farmer, unless it may be in the highlands or in the backwoods, has his sheep running near the buildings. The result of that is that the dogs are acquainted with the sheep and the sheep are acquainted with the dogs. And I believe these men that are trying to re-establish the sheep industry in New England, perhaps ought to try to encourage the dog, or rather to educate the dogs by putting the sheep into fairly good lots near the houses. Let the sheep get acquainted with the dogs, and let the dogs get acquainted with the sheep. I do not believe dogs will chase sheep if they know what they are. All of you that have young stock, young heifers or steers that you are fattening, put them out in a wild pasture where most of you want to keep sheep. What do you get at the end of the season? Why, you find that those young heifers will run like deer. They have gone wild. You let a dog get in among them, and they will run and he will chase them. It is the same way with sheep. You want to overcome that condition Instead of putting them off on a wild pasture where they won't see hardly a person from one month's end to another, and few dogs, they are ready to run at anything that comes inside of the enclosure where they are. Let us tame them by keeping them in lots near at home.

Now this morning I am pleased to say that we have
Professor R. L. Gribben, Professor of Animal Husbandr
Massachusetts Agricultural College. He will talk to
"The Re-establishment of the Sheep Industry." I tak
pleasure, gentlemen, in presenting Professor Gribben.

THE RE-ESTABLISHMENT OF THE SHEEP INDU IN CONNECTICUT.

BY PROF. R. L. GRIBBEN.

Before taking up the condition of Connecticut at the
time, and discussing her internal conditions with regard
advisability of re-introducing the sheep industry with
borders, it may prove of interest to learn something of
as a sheep state.

In the United States, prior to the year 1800, there we
numbers of sheep scattered through the country. They h
brought in when the first settlers from England decided
up permanent abode here. Most of them, however, w
indiscriminate lot, there being as many types as ther
localities. This was due to two reasons; one, that ve
had been done in any country before that time to impro
and develop any uniform types toward certain ideals; th
that up to that time little had been inaugurated in the
improved methods of agriculture. After the country had
fairly well established after the pattern laid out by th
tinental Assemblies, the next step was the development
now much abused "infant industries." England had
most part clothed the colonists with her own woolen m
tures, and even for a long time after Washington took
oath of office, it was customary among the most stylish
gentry of this new country to adorn themselves with E
made clothes. Many of the more alert minds of that da
ever, saw in this new country wonderful opportunities
domestic woolen trade. Some of these men, who had t
at the instance of the Government, in Europe, had stud
proposition of growing wool in their new land, and had
convinced that Spain was not the only country that was
to sheep growing, and had further become possessed of t
that fine wool could be shorn from the backs of sheep wh
not participate in annual transmigrations to and fr
mountains of Spain.

The first man to put his idea into action was Robert R. Livingston, the man who administered to George Washington the first oath of office ever taken by a regularly elected President of the United States. Livingston had fulfilled several missions abroad and, while Minister to France, in 1802, sent to his estate in New York two pairs of Merino, fine-wooled sheep, the first authenticated importation of that breed to this country. This was the first step in the introduction of pure bred sheep into America.

Livingston may have had the honor of importing the first Merino sheep into America, but the same year, 1802, Col. David Humphreys of Derby, Connecticut, brought over a foundation herd of that breed, the progeny of which developed into the American Merino strain, and later, from this start, came the so-called Vermont Merino, which made that state so famous as a fine wool section in the earlier half of the century just past. In those days the woolen industry was not on so firm a basis as it rested on later, and many methods of popular advertising were adopted to assist in establishing the industry more firmly. James Madison when inaugurated as President of this country in 1809, wore a domestic made outfit. The coat was manufactured from wool shorn from the flock of David Humphreys.

The originator of one of the most useful and widely known strains of the early Merino was another resident of Connecticut, Stephen Atwood of Woodbury. He founded the Atwood strain of Merinos, afterward made so famous by Edwin Hammond of Middlebury, Vermont. A fault of a great many of the early fine wool sheep was lack of a rugged constitution, which was made a principal object in Atwood's improvements. This flock had its beginning in 1806 or 1807, and Mr. Atwood paid for one of his first bucks by the wages of a whole year's work. Jacob N. Blakeslee of Watertown had a large and fine herd, as also did John A. Taintor of Hartford. To these men, with Livingston of New York and a later Consul to Spain, Wm. Jarvis of Wethersfield, Vermont, belong the credit of establishing the fine wool Merino sheep as a permanent part of American agriculture.

Of course, with Merinos as the prevailing type, the success of sheep-herding was closely dependent upon wool prices. As in the case of every "boomed" industry, people were for a time carried away with it. Some carried too many sheep for their conditions, and when wool was a poor market proposition, the sheep man was a poor credit proposition. Then there came a time when the conditions of this country demanded a chan from exclusive wool to mutton and wool combined. Connectic with a great many other states, seemed disinclined to emba in a new line, and sheep have gradually become less numero here. Add to this the fact that the reaction following the ci strife of 1860-5, dealt a most deadly blow to wool growin also the down hill aid that a great deal of tariff tinkering ga and we find eastern farmers content to allow the great west opportunity to handle that kind of husbandry.

To place more vividly before us the position Connecticut h taken in the sheep industry, a study of the following read figur issued by the U. S. Department of Agriculture might profitable.

SHEEP AND WOOL OF CONNECTICUT, 1840-1908.

Year.	Per cent of Decrease.	No. Sheep.	Wool.	Av. wt. Flee
1840		403,462	889,870	2.25
1850	56.9	174,181	497,454	2.85
1860	31.2	119,807	335,985	2.81
1870	30.0	83,884	254,129	3.03
1880	29.1	59,431	230,133	3.87
1890	21.4	46,759	218,831	4.68
1900	33.3	31,204	171,622	5.50
1908	†*8.9	*34,000	*175,000	*5.14

As the next step in this study of the re-establishment of t sheep industry in Connecticut, there is an answer to be found two questions, namely, Is Connecticut at all adapted to shee production? and — If so, is there opportunity for the re-intr duction of the industry?

The conditions to which sheep are native are found rather high and rough countries. They will do well on spar pasturage and do not require the large amount of artificial pr tection necessary for other classes of live stock. Rich pasture low lying, are not essential to their best success. In fact, t low pastures are positively dangerous for sheep. There are Connecticut, as in all New England, many rough hill pasture where cattle do not do well, pasturing horses is out of the que tion, so that all such land lies waste except for the wood cut fro it. Sheep could be profitably introduced there. There are oth pastures in the State eminently fitted for grazing sheep. Th

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*Estimates. †Increase.

question is perhaps the easiest one of any to settle. There is no doubt of Connecticut's being adapted to sheep raising, except possibly in a few of the lowest lying parts of the State.

It is the second question that causes most doubters to hesitate. Is there sufficient opportunity for raising more sheep than Connecticut now does? The conditions, agricultural and market, are not so very much different from any in the lower two-thirds of New England. Southern New Hampshire and Vermont, all of Massachusetts and Rhode Island present about the same conditions for study in relation to sheep growing as Connecticut. Therefore an answer to this question for Massachusetts or Rhode Island would be the same as for Connecticut.

In the first place let it be understood that not every nook and corner of Connecticut should raise sheep. There are places where men are doing as well as ought to be expected with what they have already. Neither will it be wise to make a complete and immediate change to the sheep industry in many places where, later, sheep may be kept on a large scale and perhaps made a leading industry. However, plenty of places present an immediate opportunity for the introduction of sheep on varying scales.

It might be well at this point to dwell a little upon a prevailing idea that the west is the only place for growing sheep profitably. A great many who would like to breed sheep here have such an impression. However, people once had the same idea of Delaware as a peach growing country. In localities which now yield peaches abundantly and with great profit, men once supposed that they would have to move to Delaware to grow that fruit successfully. The same impression has become more or less prevalent among fruit growers in general in New England regarding Oregon apples, for example, but there has been as good fruit grown here as in Oregon. Why should we allow the Pacific coast to ship its fruit away across the country to feed New England? The same logic, if such reasoning may be so dignified, would hold upon this sheep question. Are we here going to lie down in our tracks and help keep the great transportation companies in business, the western farmer in automobiles and ourselves in rags, because we will not grasp our opportunities? New England can grow as juicy mutton as Michigan or Wyoming, and can get every cent as much for it, right at her very door. Moreover, there are some people doing it today. New York farmers are taking up the industry again, and New York has no advantage over New

England, especially in regard to markets. Western ranges being divided, grains there are going up in price, the wh country is becoming more a balanced state; not one-half w high-priced land and grains and the other with both cheap la and cheap grain. This is giving the east a chance to grow own grains profitably and has given a chance also for ho meat production, which we should take up.

There are dairymen who have not been able to make th cows come up to a profitable yield who could well afford inquire somewhat into the sheep industry for their far There are also dairymen making only moderate profits w could increase the total yield of their farms by adding sheep the equipment. Sheep are great animals for cleaning up o and ends around a farm and turning them into wool and mutt To illustrate: In the middle west there are some six hund varieties of weeds and grasses. Many of these weeds serious pests to the farmers there, growing in corners and wa parts of the land, even growing in some of the best perman pastures, increasing so that the pasture grasses are gradu smothered out. There are only twenty-four of these weeds t sheep will not eat, while cattle leave about five hundred six Nor do sheep need to be starved into eating most of these wee

As a home meat supply, sheep are ideal at a season when other large animal can replace them. Meats are high n and there are no immediate prospects for any decrease in pri The farmer in the small town doesn't get a very satisfact grade of meat, whatever price he pays, because of the prese of locally killed stuff. Here is a chance for sheep that is often considered. Home-killed mutton is as free from s parasites as trichina, which makes home-killed pork more less of a gamble, as poultry. It is also a much cleaner prod than pork and has a finer flavor by far than beef. Killed home when at just the right stage of fatness, one has as h grade a product as the packing houses charge fancy prices at somewhere near living cost. There is abundant opportu on nearly every general farm in the State for sheep to be k for this purpose alone. There was a day when New Engl meat market was noticeably lower when the winter killing sea came around, but we don't hear so much of that nowad It still seems practical, and sheep will furnish summer meat well as winter. They have a strong advantage over any ot of the farm animals except poultry, because the carcass can used up before it spoils, while pork or beef would be enti out of the question for home meat in the summer. One of the strongest indications of the opportunity for sheep raising is shown by a study of any one of the leading markets of New England alone. The number of sheep annually coming to these places for slaughter, not counting the carcasses shipped in from the great packing houses, show that the New England farmer, when he buys mutton, is paying someone else a profit really his own. More sheep are being used by far in these large cities than the total number owned in the states in which the cities are located. For example, Boston in 1908 received 380,528 head of sheep for slaughter, while in the state of Massachusetts for that year a total of only 45,000 head was reported. That alone shows the abundant opportunity for domestic sheep production. There must be added to this, however, the fact that nowhere in the country are as high prices paid for these sheep products as in New England and Atlantic seaboard cities. No class of farmers has the markets we do right here, almost in our very front yards. With the shipping facilities every man has, the great market places and the fact that the demand is always good, there seems to be some little chance at least for the man who is going into the sheep business.

Wool has been left entirely out of the discussion so far, but should not be totally ignored by the sheep man. The ewe that shears eight pounds of clothing wool per year at the present prices (which show no signs of weakening to any extent in the very near future), furnishes quite a sum on the right side of he ledger, besides presenting the breeder with her lambs each year. The above is more than the average clip of fleeces per year, but it must be remembered that the average includes all the poor sheep as well as the best. It is safe to say that there are great many more of poor sheep in the State than the good ones which a man should have in his flock. An average clip of ight pounds yearly per ewe can easily be obtained from good pecimens of most breeds, and no sheepman should be satisfied with the poor animals. That is a thing of bygone days in good arming. The present-day farmer tries to get the best and hould stick to that ideal. If we want to give the sheep industry n Connecticut another "black eye," we need only to begin with oor stock.

Before taking up the problems of a sheep farm, there are a umber of factors that should receive consideration. Some are dvantages, some grave disadvantages. Only by weighing these arefully against each other, by comparing them with the actual conditions of the individual, is one able to decide intell gently as to the wisdom of adding this new industry to ol activities.

The first problem which confronts the sheep promoter is th of the dog menace. No definite figures have been obtained upo this subject, but it is a general fact that large numbers of shee are lost yearly by the worrying of sheep-killing dogs. Som years ago, a man, in the course of an investigation on the sul ject of "Sheep and the Tariff," obtained a few estimates of th percentages of sheep killed in the various states by dogs. I the table of statistics that he presented Connecticut's losses we far in excess of those of any other near-by state. The proportio that dogs destroyed was nearly six out of every hundred hea in the State. Such a loss is considerably larger than the figur would convey to the mind. Figures may express some things nothing else can, but even the statistician does not realize th loss at all as clearly as does the man who buries the sheep. T be compelled to add to the usual loss from disease, accident, et six per cent. from dogs, with the fright and worry that a bound to follow, seems too great and unjust a burden for t breeder to stand.

It was the custom at one time to lay all the blame at the doo of the cur dog and to give the finely bred dog credit of a mo "God-fearing" intelligence. Unquestionably the cur dog do his share of the work, but he is not entirely alone. More th once men have discovered some of the best bred dogs of vario breeds aiding their plebeian brothers in the destruction of flock It isn't the *scrub* dog that causes this trouble, simply because is a scrub; it is the stray dog, whether mongrel, cur, lap d (although the latter may be eliminated from the suspects sheep killing, because they would most probably be frighten to death to get out in the same pasture with sheep), or fan bred. A southern gentleman, in speaking of the number of c dogs that endangered the prosperity of the flocks there, said th "the dogs we have are the result of our character." The dark wants his coon dog, for life wouldn't be worth the living to southern darky who couldn't hunt coons or possums. As a ru these dogs are as primitive as their masters, and, from t average darky's inability to supply sufficient food for his ow needs, are compelled to search afield for their own nourishme This southern gentlemen paid his laborers a dollar each f every dog they killed trespassing on his domain, and soon ha the problem of protecting his herd solved in a manner most sati factory. Owners of dogs who didn't wish to lose their property, taught them to stay at home, or at least to obtain their mutton in other places. It may be that such a procedure is not always fair, that sometimes dogs which would not touch sheep might be destroyed, but, in my opinion, a dog is as much a man's property as his horse, and should be kept at home as faithfully. If we must have our pets, they should be restrained in a way that would not endanger the property of other residents — our co-operators in making a state. We must get over the idea of continuing forever to live under the absolute freedom and license of savagery. Many a man's activities are handicapped in a civilized community because his own selfish enjoyment — that which under savage conditions would have been perfectly proper — now interferes with the rights of a considerable portion of the community who have as certainly the right to residence there as the offender himself. Laws of communities endeavor to provide justice for *all their members.* It is not just on account of a few dog owners (or even if these owners of dogs are in majority), it is not just to withhold restraining laws, if these dogs are in any way interfering with the activities of another group of citizens. If dogs are to be kept, by permission of a group of citizens who constitute a state, then the state must be prepared to provide for adjustment of damages done, either within the state or outside. The rights of sheep men have been recognized in a large number of our states, but it seems that *sufficient* recognition should be given to *protect* this as all other industries of the state. If the sheep industry of a state so well adapted to it as Connecticut, is suffering through lack of sufficient protection, it is up to that state to do its utmost to build up the industry. This kind of protection is not that kind which fosters so-called "infant industries." There are already in Connecticut the proper conditions of land, feed, markets, etc., for this industry. The conditions are such that Connecticut sheep can be put in the New York, Albany and Boston markets, at the same prices as sheep from other states, and at a profit. No economic or political "protection," therefore, is necessary. One condition seems to hold the industry back, therefore remedy that, and there is "protection" of a just sort, one which shows no favoritism.

The foregoing applies to those localities where the sheep are really constantly in danger from ravage of dogs. Connecticut has a law which provides for the payment of suitable damages for losses through dog depredations. Other states have laws

somewhat similar. But the great trouble with all such laws
that they do not prevent. The true loss is never obtained ev
when damages are assessed. It has often seemed that trespa
laws might be taken to cover this. A man is not allowed to k
a dog unless the animal is a proven sheep-killer, and must co
tent himself in merely driving stray dogs from his place. Sor
provision should be made which would result in keeping do
at home. A man should have a right to kill dogs he catches
his property, provided they are not attended by a man in reaso
able charge, and he surely might be allowed to kill a stran
dog which runs sheep, whether any sheep are killed or no
Dogs should be kept at home, or under charge, and laws whi
compel this are only just.

In regard to damages, the following Vermont provision
one of the best. Its only drawback is the necessity for leg
action on the part of the complainant. When farmers' associ
tions or sheep associations are made an actual fact, and mon
set apart for co-operative prosecution of such cases, then farme
and sheep men will not hesitate so much to enter complaint
such cases.

" PROCEEDINGS AGAINST OWNERS FOR DAMAGES DONE BY DOGS.

" Sec. 5649. *By sheep owner.* If sheep are worrie
wounded or killed by a dog, the owner or keeper of such do
whether it is accustomed to worry, wound or kill sheep or no
shall pay to the owner of such sheep double the damages su
tained, to be recovered by an action of trespass founded on th
statute, with double costs; and if the injury complained of
occasioned by two or more dogs acting jointly, belonging
different owners or keepers, the person injured may have a joi
action against the different owners or keepers of such dogs, ar
recover joint damages and costs against all."

A further provision requiring the death of such dogs is al
in force.

FITCHBURG — SENTIMENTAL PREVENTION OF DOG LAWS.

When dog owners are given distinctly to understand th
their charges must be restrained from roaming about, and th
when caught on farms where stock are kept, symptoms extremel
fatal to canines are likely to develop immediately, there will b
fewer sheep killed. This latter is up to the farmer himself.

The following is a measure that was passed by the Genera

Court of Massachusetts on May 14, 1648, and which might prove of interest here: "That forasmuch as the keeping of sheep tends to the good and benefit of any country, if they were carefully preserved, henceforth it shall be lawful for any man to keepe sheepe in any common, accounting five sheepe to one great beaste, and if any dogge shall kill any sheep, the owner shall either hange his dog forthwith, or pay double damages for the sheepe; if ye dogge hath been seen to course or bite any sheepe before, not being sett on, and his owner had notice thereof, then he shall both hange his dogge and pay for the sheepe."

There are other pests than dogs to be considered, although dogs are, in the minds of most people who think of the matter, much the most serious ones to be encountered. The many little internal and external parasites which infest sheep, causing such diseases as liver rot, scab, gids, etc., should receive consideration and due attention in the management of the flock. They are problems a prospective shepherd must always prepare for. One of the reasons that sheep do not thrive so well on low ground, especially if at all moist, is because on such soil the chances for infection from stomach worms, liver rot, etc., are greatest. According to a leading western shepherd, annual losses from the various internal and external parasites to which sheep are liable are far in excess of losses caused by sheep-killing dogs. Sheep are close grazers, and for this reason are more likely to be infected by the parasites that other stock in grazing would miss entirely. This refers more especially to the stomach worm and liver rot. The best precautions to use in such a case as this are preventatives, such as keeping sheep on upland and well drained pastures, rotation of pastures and care in protecting water supply from infection. If a running stream in a sheep pasture flows from a near-by farm where sheep are dying or are infected in the least degree, it is very dangerous and the sheep might well be fenced away from it.

The gad fly, which deposits the grub in the nostrils of the sheep, can be partially fought by placing a little dry lime in the grain feed. This will cause the animal to sneeze, when the young larva may be dislodged. Another preventative is to bore two-inch holes in a large timber with an augur, placing the salt supply in the bottom of these holes and smearing the edges with tar. The sheep will rub off a little of the tar on their noses and the odor seems to keep the flies away.

Ticks, sheep scab and the like should be treated by dipping. Any of the coal tar dips may be used, and dipping twice a year will usually keep such parasites down. Where a flock has bee infected for a long time, the fences, hurdles and all places whe the sheep have been rubbing, should be sprayed with som disinfectant.

Objections have been made against sheep because of the supposed ruining of pastures for other stock. They are als said to run down land. No man who has ever taken good ca of his flock and prevented the appearance of parasites need fe this ruining of pastures for other stock. Of course, if a place over stocked, the sheep will keep every blade of grass dow pretty close, and other animals haven't much of a chance und such conditions. Where sheep have pastured in moderatio other stock will do well after sheep or with them. As to shee ruining land, running it down, the Italians say, "A sheep is th best dung cart." Sheep manure is nearly three times as valuabl pound for pound, as ordinary barnyard manure. This fa should be considered when the statement that sheep run lan down is made.

Sheep and other stock do not pasture well together in ever case. It is not, however, because the sheep make things uncom fortable for the horsese or cattle, but the reverse. I have see cattle and sheep kept successfully in the same pasture. Th great drawback to pasturing sheep year after year on the sam land is the danger from infection with the stomach worm. Fo this reason pastures should be changed three or four times season.

The lack of suitable fences causes many to hesitate on th introduction of sheep. The customary low stone wall of mos New England farms offers but a slight obstacle to a reall inquisitive sheep, and no resistance at all to marauding dogs Woven wire fencing is usually required, and this forms the mos expensive item in connection with the introduction of sheep o a farm which has not kept any before. Posts may be set alon the stone walls, on the outside, to keep out dogs, and the wir fencing attached above the wall. This may be made high enoug to furnish a suitable protection against dogs. Movable hurdle may also find a use in fencing sheep on rape or other gree "soiling crops."

There are undoubtedly places in this State where woo growing alone may be made profitable, but my opinion is that i the sheep industry is to be re-established in Connecticut, it must be upon some other basis than this. Wool is a product too highly speculative, while mutton is a far safer proposition, and a reasonable combination of the two the best. The ideal sheep for this State and for all New England is a mutton type, one that matures early, and dresses most attractively; with this mutton, however, should be combined as heavy wool production as a good mutton sheep can be made to yield. The advisability of re-establishing the sheep industry upon the straight sheep feeding basis, such as is practiced by Ohio and Michigan sheep feeders, is doubtful. There are a few instances of where western sheep have been brought here to fatten, but the largest gains cannot be made with old sheep; it is the youngest animals that make both largest and cheapest gains.

For many people, breeding of pure bred flocks will have a strong appeal. There are farms here that are ideal for such a business, and men who will be glad to take up that line of work. There is bound to be a demand for pure bred sheep in the not-very-distant future, but for the average farmer, pure bred animals have little attraction, valuable as they are in a money-making scheme. One great trouble is that many men have been beguiled into paying false prices for such animals. No sheep man, however, should get far away from good blood. For years men who have been breeding pure bred sheep have been keeping the blood pure for distinct purposes, and rams from a flock bred for a purpose are far better than those taken from a no-purpose flock. Well bred rams in grade flocks, together with intelligent selection of the best ewes, will not be many years in building up a very good flock, from which drifting into the pure bred business will be very easy indeed.

However, since the first cost is greater for pure bred sheep, the average farmer will, in establishing his flock, prefer to begin with grade ewes and a pure bred ram. This will make the rams in greatest demand for a time, but once the whole industry becomes firmly fixed in the agriculture of this State, there will be too few pure bred ewes to supply the demand that is bound to rise for them.

For the man who does not feel convinced that pure breds are best, there are two most useful lines of the sheep industry open; first, the production of ordinary fat spring lambs, and second, the growing of "Christmas" or hothouse lambs. This means that only those individuals needed to keep up the breeding flock should be allowed to grow into mature sheep. The reasons for preferring lamb raising over feeding of yearlings follow: First, more mutton can be grown per hundred pounds of feed on lambs than on older sheep; second, gains on lambs are the cheaper; third, there is a greater demand fattened and good types of lambs; fourth, for the New farmer growing lambs does not bring him so strongl petition with the western farmer; and fifth, there is le of loss from parasites because the spring lambs are c way before summer, the time when danger of in greatest, and the hothouse lambs are under better care closer attention than could be true if a product not s quality were being grown.

When you do take up the industry, go into it rightl want old ewes, buy them at old ewe prices, not yo prices for old ones. This is one thing which ruined industry here at an earlier date. It has given the severe setbacks in other places in more recent years, called "promoters" have introduced sheep in new lo prices far in excess of their true value. This was espe in the Dakotas when they were first being settled in the l The craze for fine wool in Connecticut led people headlong into the business, without any careful surv situation. Farmers who had shown themselves intell enterprising in other directions, pulled down their barn greater ones, or at least made costly preparations for wool, and then sent from one hundred to one thousan purchase Saxony sheep at $100 to $500 each. One imagine the feelings of the buyer, who had known nothing of sheep, when his prize packages, his gold arrived at the farm.

Starting in on a sane basis, with no booming met rather with determination and persistence, the demand grade products, the shipping facilities and the conditio are bringing western farms more to our own conditio furnishing abundant opportunities for the successful lishment of the sheep industry in Connecticut. Let us that the early bird gobbles the fattest worms, and t presenting similar conditions to our own are already to act.

The President. Is there any discussion on the pa we have just heard?

If not, I want to say just a word on the value of a means of fertilizing the land. Now in England ma farms over there are under what is known as the system. Their leases will not allow them to plow up land. They can mow it, they can plant it, but for some reason or other the leases do not allow the grass land to be plowed up. Of course, that makes it difficult to fertilize grass land, and one of the ways in which they do it is by putting sheep on to it. They put on feeding racks and continuously change the position of these feeding racks where the sheep feed, and in that way they will fertilize that field. It seems a slow process, but they do it to a very great extent.

In my boyhood I lived in the northern part of Massachusetts, and I well remember the reputation of Vermont in those days as a sheep-raising state. I remember the large flocks of sheep they used to drive through my town, and it is with a great deal of pleasure that I present to you a gentleman from that state that has such a reputation as a sheep-growing state. I am pleased to inform you that he has on his farm five hundred Dorsets. I take great pleasure in introducing Mr. P. C. Jones, superintendent of the Benton Farms.

Mr P. C. JONES. Mr. Chairman, Ladies and Gentlemen: What I know about the sheep business I got by hard knocks, by lots of failures and few successes. What I do not know about sheep would fill a big book. I know more about breeding and feeding than I do about speaking to an audience. Those two things are rather far apart, and even if I have made a success of one I may not make a success of the other.

Now I have just got several points.

First, there is no use in us New Englanders undertaking to go into sheep farming under the same chances that they do in the west. We cannot do it. We have not got the land. But the west, or the people on the other side cannot beat us Yankees, not once, in anything. We can make a success of stock farming in New England, and it is being done. In the first place, we have the right sort of stock on the farms to begin with. The right kind of men and the right kind of farms. New then we have advantages over the west in our close communication with the markets. We cannot compete with them perhaps in the quantities of sheep and the quantity of cattle that they raise, but we can raise just as good a quality, and we have got the markets to dispose of it in. What we can do is to raise the stock. There is no place on earth where the conditions, the natural conditions are better for the raising of stock than they are in New England, and that, in my opinion, is one of the strongest points in favor of stock farming that should be considered by us New Englanders. Now if we go into the stock business, if we go into the production of mutton, or lambs, or beef, and we can go into any of them provided we go in under proper conditions — there is one thing we have got to do in order to make a success of it, and that same thing can be carried on through the dairies. It can be carried on through every line of farming that we undertake in New England, and that is combination or unity. If the farmers of New England would stand together, stand as their fathers did, shoulder to shoulder, we could accomplish a great deal. If we make up our minds that we must have forty cents a pound for butter, that it is going to cost us more money to produce it, and that we must have a larger price, then all we have got to do is to stand shoulder to shoulder and insist on forty cents. If we make up our minds that we have got to have six cents a quart for our milk, and they won't pay it, hold your milk at home. They will not stand it very long. They have got to come to us. The only trouble with us farmers is that we do not hold together. We want to hold together. That is the trouble with the whole business. We do not stand together. We can put our own men in the Senate, and we can go even higher if we want to, provided we stand together. All we have got to do is to hang together, but the trouble has been for years to try to get the farmers to stand together. It has been tried, and we are making slow progress along that line, but after a while it may come. It may not be in my day, but it will come sometime, and instead of us being led we will take the other end of the halter and we will lead a while. Now that, I believe, is the secret of success with stock farming, and the secret of success in New England with dairying as well as some other branches.

Now I want to say a word with reference to the abandoned farms throughout New England. We all know that there are lots of them. Why are they abandoned? Why, a man cannot make a living on them. That is the reason. But their forefathers made a living on them, our ancestors made a living on them. "Oh yes," you say, "but they did not have to have what we have to have today. Conditions were different." Truly. The conditions were different. There has been an evolution in everything. There also has been evolution going on in farming. We cannot go back and undertake to farm those places as they used to be farmed, but they can be farmed and farmed profitably if we keep abreast of the evolution in farming, the same way that men in other lines of business have. The man who comes and tells you that farming does not pay, that a man cannot make a living on a farm, I will tell you the type of man he is. He is the man who goes out in the barn and does the chores, takes an hour and a half, then takes his milk and drives four miles to the station, and then goes up to the store and tells stories for an hour or so, drives home, gets dinner and takes a nap, and perhaps gets the chores done at night about eight o'clock. When he goes home in the afternoon, he does about two hours or more of chores, and then he says that farming don't pay. Do you suppose that our merchants, if they went and opened up their stores for an hour or so in the morning, and then closed up their places of business and went off through the middle of the day, and opened up again for a couple of hours in the afternoon, that they could make their business pay? No. Nor will farming pay when it is carried on in the same line. What has caused our farms to be abandoned throughout New England is that the cities have robbed us of our best men. They have robbed us of the same timber that made Lincolns. The same timber that made the McKinleys and the Garfields, the Tafts, and all that class of men. That is the kind of timber that was grown on these abandoned farms, and that is the kind of timber that has got to rehabilitate those farms and bring them up again. If a farmer had three sons, and the older boy, after he got through the common school, and got so he could swap jack-knives pretty well, and gave his father the idea that he was pretty smart, why, when that fellow got through school the farm was too slow for him, and he probably got into the country store. He had the push and sticktoitiveness, and the ability to make a success. His opportunities were greater in the city than they would have been in the country. He went on, built up a good business and became rich. The second son takes to books. He does not like work quite so well. The father did not have much of a chance at an education, and he determines that the boy shall have a chance. He makes that boy a minister, a doctor or a lawyer, and he leaves the farm. The third fellow comes along. He don't care anything about books, and it becomes a problem what to do with him. Well the farmer says, " He ain't good for much else, better make a farmer of him." Now that fellow will not make a farmer. If he is not good for anything else, he is not good for a farmer. The man who had the business ability and the sticktoitiveness, if he had stayed at home on the farm he would have made a success. Now what does it all amount to? Why simply this, that that old man has sent his cream to the city, and has kept his skim milk at home. (Laughter.) Isn't it time that that process was stopped? Isn't it time that some of the cream was kept at home on some of these farms?

Now let us take up and speak of these farms and what their prospects are with sheep. I am a sheep man. I have raised some other stock, but my inclination and love is for sheep. These abandoned farms I have been speaking of, and when I speak of abandoned farms I do not want you all to get the idea that I do not think that some of them ought to have been abandoned. There are a whole lot of farms in New England that ought to be abandoned, some of which are not abandoned, but some of that that are inhabited, and the same sort of land as those which have been thrown up. Now I should advise putting sheep on that land because the land is, in a way, run down and depleted. You cannot expect to take hold of those farms that nothing has been done for and expect to skin them. We have got a lot of it up in Vermont, the only trouble with it being that instead of lying on the surface it is set up on end, and some of the farmers up there have tried to skin one side and then turn it over and skin the other. Some of them have kept that up for years. You cannot expect a farm of that kind to produce much in the way of crops, but in our section of the county and, in fact, 'most all of New England, it is naturally a pasture country. Now then, take that land and stock it with sheep. Do not think because this year at home you have had ten sheep and you have raised fifteen lambs and have sold them, that you can take ten times that many and do as much with them, because you cannot do it. That is a case where the ten had a lot of care, and if you had ten times ten, while perhaps they might have some amount of care, yet you would not get the same result. Take a sufficient number, not a number that will live on so many acres, but a number that so many acres will keep to perfection, a number that an acre will turn into first-class, marketable stock, and that number of sheep should be carried on 'most any farm. Of course, the number that you can keep depends upon what an acre produces. The first thing to consider in the stocking of any farm, whether it is an abandoned farm or one that is not abandoned, is the question of fences. Now the idea of thinking that you can cut down a few brush or spend a few hours in the spring on a forty-acre lot to get it in fit shape for sheep is a mistake. If sheep do not get out they do not get in. You have got to spend a little money to get your pasture in the right condition. You cannot afford to allow the pasture to grow all to bushes, and expect that a lot of sheep are going to do well in such a lot as that. You better consider starting with fewer sheep and better sheep and better pasture, and on top of all that see to it that you have got some good fences to keep the sheep in and keep the dogs out. Now I do not know what your conditions are exactly down here, but we are not a great ways from you, and I imagine that our conditions are about the same as yours, except that our country is a little rougher. I do not know what it costs us to fence land. I am buying wire at fifty-five cents. I figure that it costs me under the conditions and the prices that I have to pay for wire and posts about $256 to fence forty acres without the labor, but that is a fence that is a sheep-tight fence, and you can take and put a dog in and I will bet you he will not be able to get out. I went up to one of my mountain pastures this fall deer hunting. We have a number of deer up in that section. There was a dog that got into that pasture; he had got away from the party and he had been in there long enough so that he was so weak that he could not get out. He was so weak that he could not kill sheep, anyway. That fence has the wire stretched to the posts so that it is very close to the ground. If there is a little hollow under the first strand of the wire, we gather a few stones and build up under the fence. That is not only done this year, but next year before my sheep go on the mountain. The pastures are all gone over carefully. If there is a hole under this fence, we put stone in that big enough so that a dog cannot pull them out. We put stone there that are going to keep him back, and I have not had a sheep destroyed on our place in seven years. From the time we put our sheep out in the spring until they are brought in in the fall, they are never put in a corral. They are never put in a sheep barn. So you see they are right out in the open and if the dogs could get at them at all they could run them. So much for the dog end of it.

Now I do not think that the way we handle sheep is the best way, but perhaps ours is the best for our conditions. There are many methods that are better than ours. Many a man would handle them better, a great deal, than I do, but I try to handle them the best I can under the conditions as they exist in our locality and we do get some results. Now, of course, if a man was as good a trader as that first son that I talked about that went to town, you might make a swap and get into the sheep business, or if he was like a friend of mine, or acquaintance of mine, that I knew in Texas, he would get along first rate; that if you were a good trader you might make a success if you went into the sheep business. But I am not going to spend all my time telling you stories. I am over-stepping my time now.

Now we will take up the feeding of the flock and the handling of the flock through the summer and through the winter. I cannot tell you the best way to do, but I can tell you how we do it. I turn out usually in our section about the 20th of May. The sheep are put right on the mountain, presumably turned out to pasture, but I do not turn them out to pasture exactly, because I go up once in a while on Sunday morning and give them salt. You turn them out in the pasture and go and look after them. You have got to do it if you are going into the sheep business. A man who goes into the sheep business, who thinks that all he has got to do is to turn his sheep out and let them take care of themselves is not going to make a success. When it comes shearing time and when it comes time to sell the lambs, if that flock has been taken care of as it ought to have been, you will hear a better story out of the sheep business. A man does not buy his cattle and milk them the next morning and then let them go until the following morning. He knows that is not the way to take care of dairy cows. If you go into the sheep business, go into it with the same idea — that you are going to take care of the flock. You do not have to go every day, but you do want to keep in touch with that flock so they will see you and so they will have some idea of what you are when you go into the pasture.

Do not adopt the practice of going around to see them once in three or four weeks. They ought to be salted regularly. Go and see them every two or three days, if you can. You want to keep salt before them all the time and with that salt you want to teach them to chew tobacco. It is a mighty bad habit for some men, I know, but it is a mighty good thing to teach your sheep. It is pretty good stuff and it is very cheap stuff to give sheep. I buy tobacco for them all the time and it is cheap stuff. Now that is practically all the care that those sheep get during the summer. I go over and look after them as often as I can, and if one of them is not acting right, or if I notice anything the matter with any of the flock, I remedy it. Sometimes some of them will get hurt by stepping on a sharp stone or something of that kind. I go up there to see that no dogs have got in. I do not expect to find any, but something is likely to happen in a bunch of sheep at any time. I figure that those sheep should be fed at least three times a week by someone, and at least once a week by me. I do not send a man if I am at home.

Now then in the fall we bring them down to the barn. We usually change the pastures in the summer; usually we make it a business so as to bring my sheep in the fall, my breeding ewes, in the very best shape that we can. If I can bring them in in good shape in the fall, I can carry them through the winter at very much less cost.

Now for a winter ration I feed a mixture of oil cake, oats and bran. One hundred pounds of each. I figure that each grown sheep shall get about a pound a day, and I mean by a pound a day sixteen ounces to the pound, not three-quarters of a pound. I figure that they get it, and if I find in my flock a few sheep that are not doing well, I take them out and feed them by themselves and they do well for the extra time. I also use ensilage at the rate of one bushel to ten sheep. I feed roots, both mangels and turnips. I never feed mangels to a ram. The quickest way to have a ram commit suicide is to feed him mangels. Whether it is in the locality or whether it is something about the way we grow them, or whether the variety of mangels, or something of the kind, I do not know what it is, but I tell you they kill them fast, but turnips do not. Mangels will not hurt the ewes. That is about the way we feed them. Of course, we have to feed the individuals that we have cut out a little different from that, perhaps. We sort them out and treat them as each case requires.

With our lambs, when pushing them for market, we feed a little different, but I had not intended to take up the lamb end of it; at least I will not until later.

Now the showing and the judging of sheep is a point that this sheep breeders' association, as well as all other sheep breeders' associations, should consider. There is nothing that will do more for the sheep industry of New England than the showing of good sheep. There is no greater advertisement for any particular sheep than the good showing of that breed. Now if we are going to hold down our breeders, and allow all the premiums to go to imported sheep which are the product of an experienced English shepherd and breeder, instead of giving them for the encouragement of our own home breeders, we are not going to do a great deal to help our home breeder. If we are going to give our premiums in that way, we should give up the business. Personally, I do not care anything about it, because I would rather show against an imported sheep than not. I believe that the Yankee can raise just as good sheep as any man on earth, and I am a Yankee, thank God.

Now the judging of sheep. It is an awfully hard thing for any agricultural society to decide, or to find the right man to judge your sheep. He may know one certain breed of sheep, he may know one certain type of sheep, but when it comes to putting one man to judge sheep from fine wool, and on to the coarse wools, it is pretty hard to find a man who is competent to fill the place, and you must have competent men if you are going to put the premiums where they belong. It does not make any difference how honest a man is, if he does not understand the breed he cannot put the premiums where they belong.

Then in the selection of sheep and starting the sheep farm, people tell you that half of your flock is the ram. Yes, five-tenths of your flock is your ram, and then just add four more tenths to it, and you will get it about right. When you do that, you will have to give the ram what belongs to him. The ram is a very important part of your flock if you want to make money out of it. I would not recommend any man, if he is going into the sheep business to make money, to go in unless he has capital unlimited or has time and plenty of it, because a young man starting to go into the sheep business with the intention of breeding thoroughbreds and selling them, even for stud purposes, I would not recommend it, because you see I am in the business. (Laughter.) Yes, we are in the business, and we have been in it for fifteen years, and we have got a reputation established. We are making sales and doing well, and there is room in the business for all of you, but I would not recommend everybody to go into that line. You can get money out of the sheep business quicker by going into another line. If I personally, were starting in the sheep business tomorrow and wanted to invest in the sheep business a limited amount of capital, I should buy native ewes of good quality. I do not care whether they are Shropshire grade or Hampshire grade, or whatever grade they may be as long as they are good, hardy sheep. I should buy those, dividing them between lambs and yearlings — so that they had never been bred. If I was buying ewes that had been bred, I would not hold them over one season. Then I would buy the best horned Dorset that I could buy. I breed them and handle them because I believe in them. I believe in them because they have made good. Now then, if you are satisfied to breed strong lambs which will sell to the butcher for four or four dollars and a half apiece, then what I have got to say will not interest you, but if you want to get out of the business all there is in it in the way of dollars and cents, then you want to raise what I call the hothouse lamb. That is the lamb that is dropped in October or November. Now I am not telling you this without something to back it up. I have no grade ewes now, because our demand for thoroughbreds is such that I have not room for both. I breed almost every breed as a cross with the Dorsets. I do that because there is no sheep on earth that will give milk equal with the Dorset. Now let the man that has got some breed that he thinks well of stand by them just as strongly. I am not saying anything against other breeds, but I do claim that the Dorset ewe is one of the best sheep in the world for milk. The first cross of the Dorset, the ewe will almost invariably increase the milk supply at least one-third over her mother, and oftentimes one-half. Now that is a strong point in the raising of early lambs. I sold out all our grades last spring, a year ago, I think it was. The 22d of December, I commenced to ship lambs to the New York market. I never ship lambs over twelve weeks old. Most of them were from nine to eleven. I commence to kill when my lambs weigh from 45 to 55 pounds on the foot, and I sell where you can sell and where everybody can sell. I do not sell to any private customer at hotels, but I sold in the open market through commission men, who are willing to do the business for you or anybody else. I just simply put a few of these facts before you so as to show you how I handle the business. As it happened I got my top price for those lambs. It happened to be my birthday. Those lambs sold for thirteen dollars apiece and netted us $11.98 5/6 per lamb. That is after paying the express charges, commissions and everything. Now, gentlemen, that pays better than four dollar or four dollars and a half per lamb. The man who can get ten dollars per lamb at nine weeks old can make some money in the sheep business. Now those lambs cost us very little. That lamb is made almost entirely of milk up to that time. We do everything we can, however, to push that lamb along when we once get it started. We feed some cracked corn and push them for everything that we can, but you cannot get a great deal of grain into a lamb when he is only nine or ten weeks old. Now on February 6th I shipped some at that time which netted us $9.19 1/6. That was one grade, and there was another grade which netted us $10.44⅔, and on the 20th another shipment which netted us $10.60½. Those prices are net. Those prices were received in the open market through a commission house. You can produce that lamb just as well as I can. There is the kind of lamb you want to raise in Connecticut. It is the kind we want in Vermont or for any other New England state. We are in close touch with New York and Boston, you are in close touch with Hartford; and the best markets, to my mind, the best market for the northern lamb, or for New England lambs, is New York. There is no danger of your flooding the market. The price there is better today than it was seven years ago. Now do not get the idea that a hothouse barn is necessary to raise hothouse lamb. There is no day in the winter when it does not storm that my ewes are not outside. I do not care how cold it is if my lamb is dry. I want them to get out. I want them to eat. I want them to get all the exercise they can, to get an appetite, and if they get an appetite they will eat and get fat and satisfy my pocketbook. That is the hothouse lamb business. It can be carried on here profitably, and the greatest point of all for the winter lamb is that the winter lambs are not troubled with the stomach worm. My lamb is born, developed and sold at a season when he doesn't get it. The stomach worm, except in rare cases, never does any particular damage to the yearling, but the lamb that is dropped in the spring and is turned out on a pasture that has been pastured last year by old sheep, will certainly become infected. If the pasture or flock itself is infected, and there are very few that are not, then you ought to take some means to overcome them. We do not have any trouble with stomach worms. In the first place, because we try to prevent them by all the means that we know, and in the next place I always figure on putting my lambs that I am going to hold over for stock on a pasture that was not used for sheep last year. I use a pasture for my young cattle or for my dry cattle this year, and next year I give that to the young lambs or lambs that I am going to hold over. In that way we ward it off.

Just one more thing that I want to take up. We often hear people say, and sometimes we say it ourselves, that we cannot afford to raise meat because grain is too high. We cannot raise corn to compete with the West. Have you ever stopped to think that you can do it and that we do do it in New England. Corn in eleven states north of the Potomac River and east of the Ohio River averaged 38 bushels to the acre; for the states of North Carolina, South Carolina and Georgia, fifteen bushels to the acre. And the average for all the others was only twelve and one-half per acre. The average farm value was 30 cents. The Ohio average was 38.5 bushels per acre, Indiana 30.3 bushels per aere, Kansas, 22 bushels, New England, 37 bushels. Ohio beat us one bushel, and yet we hear people in this section say that we cannot raise corn in New England. We do not raise the acreage that they do, but we can get the results.

Now then, speaking about cattle — in the State of Vermont alone we have 288,000 milch cows. We have 214,000 other cattle. In other words, we have 100,000 more than in the State of Idaho, which is a cattle state. In Vermont we have only about 9,000 square miles, most of that stone on edge, which makes our sheep's legs a little longer on one side than on the other — we cannot compare with lots of the western states in acreage or in area, but there is something in the grass and in the climate here which makes it well adapted for sheep-raising purposes, and it is up to us to find it out and take full advantage of it.

Now, gentlemen, to come back for just a moment to what I started in with. What we want most of all among us farmers and among us New England farmers is to stand together shoulder to shoulder, push and work together, and do anything that is square and honorable to put the New England farmer and stock raiser and his good wife on the pedestal where they belong. I am willing to help. (Applause.)

The PRESIDENT. Are there any questions to be asked of the gentleman who has just addressed us?

QUESTION. What kind of a fence do you use?

MR. JONES. I use the American wire and the electric weld.

QUESTION. How high do you build the fence to keep the dogs out?

Mr. JONES. It is a fifty-eight-inch fence. What we call ordinarily a five-foot fence.

QUESTION. And you think that will keep the dogs out and them in?

Mr. JONES. Yes, sir.

QUESTION. I would like to ask the gentleman what he means by stray dogs?

Mr JONES. Those that you cannot keep at home.

The PRESIDENT. The next gentleman whom I have the pleasure of introducing really needs no introduction to any Connecticut audience. His interest in this subject of the sheep industry is something that is known to you all. Mr. Stadtmueller of West Hartford.

Mr. F. H. STADTMULLER. Mr. President, Ladies and Gentlemen: I shall not ask you to bear with me this morning. It is getting late, and I know you are anxious to adjourn. I intended to talk about the dog laws of Connecticut. The question of good dog laws in Connecticut is something that is of interest, not only to the people of Connecticut, but especially to Connecticut sheep breeders 365 days in the year. But owing to the lateness of the hour I think it will be more pleasant to the audience and serve every purpose if we dismiss my talk from this portion of the program at the present time. Therefore, I shall beg your indulgence to at some other time take up this question for discussion.

Before taking my seat, however, I wish to call your attention to the wool exhibit in the rear of the hall. I am sorry, but the exhibit will have to be removed before the afternoon session.

There are some matters that perhaps it would be well for the Sheep Breeders' Association to decide for themselves, and I was going to announce that after the adjournment of this meeting that there would be an election of officers. I will ask for a meeting of the Connecticut Sheep Breeders' Association immediately following this meeting in the front part of the hall, and then if it is the pleasure of the members to vote to adjourn until after dinner they can take such action at that time.

Meeting adjourned to 1:45 P. M.

SECOND DAY.

Afternoon Session.

Music.

Convention called to order at 2 P. M., Vice-President Lee in the chair.

The PRESIDENT. Farmers, as well as others, are rather sensitive about having their business affairs inquired into. It is known to most of you that the United States government will take a census in 1910, and we have with us Professor Bailey of Yale University, supervisor of the census for the State of Connecticut, and he would like to say a few words to you in regard to the questions that will be asked of you and the way that he would like to have them answered.

Professor BAILEY. Mr. President, Ladies and Gentlemen: The census is nothing new for any of you. The census of the population is the oldest in the United States of any country in the world, it having been first taken in 1790. But we never had any statistics in regard to the towns until 1839, and then they were gleaned for the government by a Connecticut man, Mr. Ellsworth. The Commissioner of Patents, who had charge of the matter at the time, had appropriated for him by Congress the immense sum of a thousand dollars. He could go ahead and spend it any way he wanted. There was a good deal of curiosity as to how he should distribute about thirty thousand packages of seed that he was to send out. He made an estimate of what the farm products would be in 1840. In 1840 they wanted to put some questions in regard to farms, but nothing very definite was done, and it was not until 1860 that the first questions in regard to a farm census were asked in this country. From that small beginning of one thousand dollars, voted to this Connecticut man, the matter has grown until we now have an appropriation of about thirteen millions, and over ten thousand men continually employed by the Department. In this year of 1910 the work will begin on the fifteenth of April. Formerly it has been the first of June, and the farmers have been too busy on the first of June to stop and give the government agents the information that they wanted. And so it has been decided to have the enumeration on the fifteenth of April. There are two kinds of questions which are to be asked, which may perhaps need some explanation. The first is an inventory: how much is your farm worth with its buildings, its vehicles, its tools, machinery, cattle and live stock of all kinds? Now it is not a bad plan to stop once in ten years and take an inventory of what we have got. Every business man takes one every year, and the government is hoping that this inventory, for which it asks, can be taken of the value of the farm property of the country this year and in the future.

There is to be a second list of questions, such as, What is the income from your farm, and what did you raise on it during the year 1909? Of course, that is going to take some thought. These questions have, most all of them, been printed in the various farm journals of the country, and most of them are pretty generally known among the farmers. It has been the policy of the directors of the taking of the census to give as full information to the farmers as possible, and we want the matter to be fully understood, so there will be no hesitation upon the part of the farmers in answering these questions as fully and as correctly as possible. Therefore, when these enumerators come around to you for information in regard to the value of your farm and farm products, I hope that you will be willing to give them something definite, and not be obliged to tell them that you will talk with them by-and-by, or that you will think it over, or give them some such answer as that. I hope that you will do your best to have these schedules prepared, and have them as accurate as possible.

As to the men who are to do this work. There is to be one to three enumerators appointed in every town in the State. It is our intention to select good live capable men, men who know something about agriculture, and men who are trusted in the rural districts. I can tell any of you the name of the man who has applied from your city and town, and if satisfactory men have not yet made their application, give me yours. I am going to do the best I can to see that the farm census of 1910 is as good as was ever taken, but it needs the co-operation of men like you to make the success that we hope it will be.

I just wanted to make this brief explanation, and I thank you for the privilege of bringing this matter before you.

Secretary FANTON. Professor, one question: in regard to giving the valuation of our farms, will that be made compulsory? Will that be made public?

Professor BAILEY. I am glad you raised that question. The only person who will know the valuation will be the enumerator, who will be a man who will be sworn to secrecy under a severe penalty. That will appear in no publication, and the individual valuations will not be given out by the government. All of those figures will simply be grouped together.

Secretary FANTON. I thought I would ask that question, as I thought there might be discrepancies in some cases between the valuation given to the enumerator and the valuation that is given to the assessor, which perhaps might lead to some trouble.

Professor BAILEY. The government has tried to head that off by providing that no assessor shall be appointed as an enumerator.

The PRESIDENT. Gentlemen, before we proceed with the next lecture, I want to say that in nearly every chair you will find a slip of paper like this (indicating). This is for you to write down any questions which may occur to you while the speaker is talking. We have a question box, and if you will deposit these questions in the box, or if you will send them to the Chairman, we shall be very glad to discuss any question which you may offer.

Through the instructions of Dr. Jenkins of the Experiment

Station, the men who are doing good work with corn raising, like Mr. Brewer and others, have been able to make an exhibit that would look as though Connecticut was still in it in corn raising. Today we have a New England man to talk to us on that subject. He comes from the Amherst Agricultural College. I am proud to have a Massachusetts man here to talk to you. I now take pleasure in introducing Professor J. A. Ford of Amherst, who will talk to you on corn raising in New England.

Professor FORD. Mr. Chairman, Ladies and Gentlemen: I have been talking corn so much in the last two years in New England, that I am almost ashamed to have my name go on the program, but I believe in corn most thoroughly. I am a good deal like the good man who got home pretty late. His wife found a good deal of fault with him while he was getting to bed, and she said a good many things to him, but he finally went to sleep and his wife was still talking. He waked up, and he said to her, "Mary, is this yet or again?" So I cannot help thinking that perhaps some of you may think is this yet or again. However, it seems to be my mission to talk corn, and it is a pleasure for me to do so. There is a story that illustrates what I mean, and as it seems to apply right here I will take a moment of your time to relate it. A young man was walking with his sweetheart, and just about as he was to leave her at the gate of her parents' home he kissed her. She looked up at him in a half-angry manner, and she said, "What business had you to do such a thing as that?" "Well," he said, "Mary, that was not a matter of business. That was pleasure." (Laughter.) It is a pleasure I believe for me to talk about corn, and I do believe that if we were to pay more attention to corn that we would get more pleasure out of life. There are so many interesting things in the country which if brought to the attention of our young people I believe would induce them to stay in the country and devote some attention to farming. A definition of happiness has been given as capacity to receive sensations. Now all education tends to increase our power of happiness, our power to get happiness, and, as I said before, I believe that the young man who is observing will stay in the country and make a success of it. I certainly believe in corn for New England. More corn. I do not know as it is possible to estimate the amount of corn purchased in the State, but I suppose most of you have some idea of the amount of corn that is used or purchased from outside of the State in your locality. Now just think of that, and remember that the average price for a ten-year period has been at least sixty cents. Remember it, in this connection, that the average yield per acre is less than forty bushels at sixty cents. Now I say that the amount of money that we are paying out for corn ought to be kept at home. How are we going to do it? It can be raised for less than sixty cents a bushel, but in order to do that you must raise more than forty bushels per acre. We can do it. Remember that there are a good many better yields than the average, and also that there are a good many poorer. Think of what those fellows are doing that are raising less than forty bushels per acre. We must have the advantages of improved methods and improved machinery. I think the time is coming when we ought to plant by improved methods. We have an opportunity here today to begin to plan improvements, and if anything I may say will prompt you to begin to plan those improvements I shall be glad. We must plan ahead in order to get ahead.

Now I know that some say that it does not pay to break up new land for corn. Well, perhaps that is true to some extent. It depends a good deal on the quality of the land. I have known of an instance where a man cleared land for twenty dollars an acre, land covered with stumps. He has done it again and again, cleared this land, and gotten enough from the first crop to pay. There are lots of places in New England that need cleaning out, working up and planting to crops. Corn is a first-rate good crop to put into these places that are cleaned up in the way I suggest. I know it is hard severe work, and I know that the labor problem is a big one for the average New England farmer. The complaint has been general that farmers could not secure the proper kind of help, but it seems to me that we want a few improved methods with respect to that help question. It seems to me that we have got to adopt a new plan. If every farmer in New England or the United States who employs the time of one man would put up a tenement house for him I believe that it would go a long way, gentlemen, toward solving the labor problem on the average New England farm. The man who hires out as farm help, if he has a family, wants to have his family with him, and he does not enjoy being tucked away in any old halfhabitable quarter that you happen to have about the farm. The manufacturer has had to do that, and we have got to do it. It means more capital, but it will pay because it will go a long way toward the solution of the labor problem. Do not make it too cheap a house. But I did not mean, Mr. President, to digress in order to discuss this farm question.

Now just a few words about how we are going to get this forty bushels to the acre. The experiments carried on for a number of years show that they get the highest yield of corn where they have solved the question as to the best distance apart to plant, and that has been found to be three and one-half feet, with three stalks to the hill. Now some further experiments carried on in Illinois, the results of which were published last year, show that in the northern part of the State they gained the most, or the best results, from corn planted three feet each way and with three stalks to the hill. It seems to me if in Illinois and Ohio they can do that, we, with our shorter season, can plant three feet apart each way to good advantage. I do not state that as a definite fact, but just consider what three feet apart means. As I figure it — and I hope you will take a pencil and figure it for yourselves — three feet apart each way would mean 4,840 hills to the acre. Now suppose we drop off ten per cent., and allow one hill in every ten to be missing. Take off ten per cent. and that would still leave 4,356 hills per acre. Suppose we get three stalks on our ninety per cent. That would be 13,060 stalks. Now our friend Mr. Brewer has raised lots of ears that would weigh a pound. Suppose we reckon that you will, and divide that by seventy, which is the weight of a bushel, and you will find that that gives you a yield of 186 bushels, and yet the average is below forty bushels. You say, yes, but we do not raise pound ears. Suppose you raise half-pound ears. There is plenty of Flint corn that weighs more than that, but still you would get ninety-three bushels, if we have a ninety per cent. stand. Now those are pretty big figures, gentlemen, when we compare them with the average, but they only serve to emphasize the fact that if you are going to get the yield you must get the stand. That is the first essential of a good crop of corn — a good stand. I want to take up in a brief way how to get that stand. First, let us take up, before we come to that, the question of improving the corn. How shall we go about it? We have paid comparatively little attention to plant breeding. We have done considerable animal breeding, and know a good deal about animal pedigrees. Those are all familiar to you, and we are used to thoroughbred live stock. Most of us keep thoroughbred horses and thoroughbred cattle and poultry. But plant breeding is so much easier that it is sometimes surprising to think how little attention has been paid to it. It is easier because, in the first place, the number of individuals can be enormously increased, and also because those individuals will be of little value, but you can cause those individuals to come to maturity in one season. Now there is one very important element about plant breeding, a thing which lies at the bottom of success of plant breeding, and that is plant selection — let me repeat that, plant selection, or the careful selection of the plants from which you get your seed. That selection should, of course, begin with the seed. The plant is the basis of all selection, in the ear or kernel. I have a chart here showing the result of the work done in Ohio by a friend of mine. He believed that the place to select his corn was in the field, because, he said, I want to know what kind of condition my corn grows under. I want my seed to be raised under the same condition of environment as I am going to raise that corn in the next year. As you pick your corn, as you husk it, it should be placed somewhere by itself. This is the method that he pursued. He said to his help, "I want you to go into the field and pick some good seed ears, but you must pick them from hills that have three stalks." The help laughed a good deal, but, of course, they did not understand what he was after. He took those ears and carefully dried them in cold storage. When that corn was cut he again said to his help, "You pick out now some good seed ears," and he planted those the next year in ten-acre plots. All of those were planted three stalks to the hill. The first yielded 76.6 bushels, the second 68.6 and the third 70.8. You see what a large difference there is all the time in favor of the field planted with selected seed, there being an average difference in the three of 3.25 bushels. He was careful to have every condition exactly the same, so that I think we are justified in saying that the field selection of seed is a very desirable thing. You take the best farm men, with a brown sack around the shoulders, and send them right through with directions to pick from hills having three stalks, and then by taking proper care of the seed gathered in that way you will get seed which will increase your average considerably. We take good care of that. After the seed is gathered, of course, we want to take the best care of it possible, and dry it by heat, keeping moisture away from it so that there is no premature sprouting, which, of course, will spoil it. Plant that the next year.

I have here a sample score-card. I would like to say with reference to the score-card that the object of the score-card is to call your attention to points that need consideration. That is the main purpose of the score-card, and, from my point of view, it has a very educational feature. These are a few of the points you should consider in picking out your seed ears. The first point is to make your selection in the field during the fall of the year preceding the time when you want to plant the seed. Select the seed with the points in mind which I have pointed out to you. Of course, in using this score-card, I use it simply as an illustration, and not because it applies here. There are simply some points that should be varied undoubtedly in Connecticut. I believe it is a good point to form your own score-card to pick out your own ears from. Get an ideal that you think is pretty nearly perfect, and then try to square up to that. But a more important point than that is the fact that you must mature the seed and keep the seed under proper conditions in order to get the highest yield from it. That may not apply so forcibly in Connecticut as in some other states. The main point is, of course, to get good seed, with a high average of vitality, because if the seed is not good our labor is wasted. This has been an unfortunate year for corn, but, as you know, it has been an unusual year, especially in New England, on account of the continued drouth, but we are hoping for a better season next year.

Speaking about uniformity of size, a good deal can be done to bring that about. We are going to have a corn show in New England. We had a good fruit show, and I believe a corn show would be a good thing. When you put your exhibit into that corn show, I hope you will put in a uniform exhibit, every ear of which shall indicate your ideal of what a good ear should be. I understand that you do not have corn shows down here, except such exhibits as are shown in connection with the meetings of your agricultural societies. I have attended a good many such exhibits and looked them over, and could not tell for the life of me what a man's idea of a good ear of corn was. You know just as well as I do that if you are going to put fruit in the market, a uniform product sells at the best prices; that you sort your apples into different kinds, No. 1, No. 2, etc., and the more uniform they run in size, appearance and quality, the higher the price. At some of the great selling centers, where they have hundreds of cars come in from day to day, where a car comes in from a certain region where the growers have banded together to properly sort their crop, when an inspector gets into a carload like that and looks it over, it at once demands a higher price because it is uniform. It demands a higher price, not only because of the appearance but because it is shipped better than that which is not uniform. The same thing applies to corn. If corn is shipped so that it heats it means that the corn has got to go into an elevator and will lose a good deal of moisture before it can be sold. It decreases in weight and in price. So I think uniformity is important. The growth of corn of a uniform size and appearance is very desirable to encourage, because it tends to fix an ideal for a uniform product.

Now as to the shape of the kernels, the size and the germ. Those points I think I can emphasize by this chart. This chart was made for Dent corn growing, but it brings out the principle, I think, very clearly. Of course, we have here a shape of kernel that more nearly approaches the Flint corn. It is undesirable as a Dent kernel. It is too shallow and contains a good deal of space that ought to be filled with the grain. This in some ways is very undesirable. Then, too, what we call the shoe-peg kernel is undesirable, not only because it has a lot of space which is not filled up, but because the germ itself is small. The germ, of course, is the embryo plant for the next year. The kernels of this type produce small germs and the kernels of this type large germs. Now not only is the large germ desirable, because it starts quickly, but it is more apt to be strong and fuller of vitality. This, then, is the desirable shape for the kernel in Dent corn, and it seems to me we might think of that in studying Flint corn. Then, too, in this character of corn you will see that the kernel is well carried out to the tip of the ear. The cob is well covered with the grain. We want corn and not ear.

It seems to me also that this brings out the desirability of the wedge-shaped kernel. The color of the grain or the cob is not so important here, but I presume Colonel Walker from Kentucky would say that down there it is desirable to have a corn of uniform color, and that the yellow-colored corn must have a red cob. It all indicates the necessity for a careful attention to uniformity again.

If you have the wedge-shaped kernel, you will have very little space between the rows. In the Flint variety you know there is a tendency for the rows to spread and leave open spaces, and I should think we had better select corn that would not show those characteristics. The length and circumference, I think, should be considered together. If you have a small cob, you will get a high per cent. of grain, but you won't get as much total weight of grain. In other words, if this cane was a cob of the same length as that lead pencil, you would get more grain around that cane than on a cob the size of the lead pencil. In this connection there is another thing to think of. It is my experience, as a general statement, that the larger the cob the later will be the maturity of your corn. That is, when you get a late variety you are very apt to get a large cob. So I would say that this is something which must be decided and determined by the individual grower. It depends a good deal on the latitude and the climate of the locality where the corn is grown. You want to be careful in increasing the size of your cob on that account, particularly if you are looking for an early variety.

Fullness of the tip and beauty of appearance are minor points. Some of you probably read the Breeders' Gazette and perhaps have read the article written by the Wing Brothers of Mechanicsburg, Ohio. I was at a corn show a while ago and judged some of their corn. They had a very fine variety of corn. It yields well and is high in quality. The corn, however, is not very smooth. On some of it the rows are crooked. I said to him one day, "What in the world do you have those spiral rows for? Why don't you breed that out of your corn?" "Well," he said, "the fact is when I started or when I decided I was going to improve my corn, I paid very little attention except to those things which would pay, and I could not see at the time that straight rows ncreased the yield a particle." He said, however, that when he ucceeded in getting a good variety there was a demand for it or seed purposes and the people wanted straight rows. Then e had to begin to pay attention to that element and to get somehing which he should have obtained in the beginning. He said hat it would probably take him several years to breed it out so s to get straight rows instead of spiral rows. I know of a good orn man who says that he would just as soon have a little space n the tip of the cob. Of course, that is a matter of taste. The act that there is a little space on the tip would indicate that erhaps the cell from which the germ develops had been improprly pollenized or fertilized. The corn is fertilized by the pollen rom the base upward, and it takes perhaps eight or ten days to ertilize the length of the ear. For myself, I should choose an ar that was well developed on the tip. As soon as I found it as mature, I would endeavor to select specimens of that kind for eed purposes. In my locality particularly I would prefer to ave the kernels carried out well to the tip. This may be a fancy oint, but I do not think it will do any harm to pay attention to it.

Now to go back for a moment to this question of selection. n the first place, in addition to what I said about other points, e must pay more attention to adaptability. We need to select arieties that are adapted to our locality. In most instances armers do not go very far from their own farm for the purpose f selecting seed. That may not always be a good plan. It is ell to get seed and perhaps before planting it extensively to xperiment with it a little to see if it is adapted to your particular ocality. I think by all means it is a good plan to make an experient station of our farms in a small way. You will find, I think, n starting to improve your corn, very likely in your own neighorhood a better variety than the one you could get from one f the corn belt states. But, as I say, the selection of the right ind should be, to some extent at least, a matter of experimentaion. You may find somewhere in your own county, or perhaps in our own town, a man who has been paying attention to the uestion of corn breeding with the idea of finding a variety that s adapted to that locality. If you go to him and get a little of his eed, you can very often get a start that will be worth several years to you, whereas if you have to get your seed from a locality which differs from your own to any great degree, it may take you four or five years to acclimate it. On this score-card we have given thirty-five points to adaptability. This is especially true of Dent corn in New England. I believe that we can raise more animal food per acre with the Dent variety than we can with the Flint, but, on the other hand, in the state of Ohio there are counties that can raise more Flint corn than they can Dent corn per acre. So if you are on a poor hill farm, which is not very fertile, and with hard conditions and with no special adaptability of the soil to the corn plant, I would say stick to your Flint corn; but if you are on a fertile river bottom, or on land that is well adapted to the corn plant, I should say, by all means, to try the Dent variety, because I believe you will get more animal food per acre than you will with the Flint variety.

Now as to the height of the plant and the inclination of the ear. Just a word about that. We have not paid much attention to it in New England. I do not know whether we should or not, but in the corn belt states they prefer to have the angle dipping down rather than up. They say that when they have wet weather in the spring that the water is apt to soak in, and that they get more mouldy corn from corn which stands up straight. They paid a little attention to it at the Illinois Station, and found that they have an increased length of the arm or length of the branch upon which the ear is borne. That is not a very important point, however. It is one of the refinements.

Now trueness to type. A good dairyman does not have as many different types as he has animals. He has a good type right through, one which represents, at least to some extent, his ideal, and it is necessary in order for you to get ahead to know what you are breeding for, and what you are after in the development of the corn plant. I want to get a good heavy ear. But one of the important points to look at is the kernel of the corn. Now I would like to say in connection with corn shows that we are trying to hold some corn shows in connection with the Grange meetings. I have already gone to two or three. If you hold corn shows, and I hope you will, because it is good to get together, look at the kernel of the corn every time. It is the kernel that is the crux of the whole matter. Take the kernel out and study it. See the size of the germ, the extent of its development, and generally how it is situated. It is a very important point to study the kernel. If you study the kernel carefully you will not have much disappointment in the weight of the ears, because you will soon learn by an examination of the kernel to know what sort of an ear is going to be produced. Now that is particularly so in judging in the field, when selecting your seed. You want, of course, to produce vigorous plants, and a plant that will grow up as high as you think it should be. If your corn is running too high, why choose a plant that is shorter, but aim all the time to get uniformity of type, or trueness to type. You may have to change your ideals, but you should work for that type.

Just a word about the care of the seed. Having selected the seed, I believe it should be dried artificially, if possible. I believe that our high yields are due to the fact that we have taken care of our corn and got it pretty thoroughly dry. It is very essential to keep the seed under conditions where it shall be free from moisture or heat, which will not in any measure start germination until the proper time comes. In the corn belt states they have carried on some experiments along that line. I visited Wisconsin, and at the Experiment Station Professor Moore took me into a basement where he kept the seed. There he had a place where he had packed the corn up in tiers. The conditions were such that I said to him that I should not think he would get any germination, but, as a matter of fact, his seed was handled in such a way that he was able to tell within a very small percentage of just what per cent. of germination he was going to get. He claimed to be able to get germination of ninety-eight per cent. I wonder how many here know the per cent. of germination of the corn used for seed before it is put into the ground. If the corn which is to be used for seed is thoroughly dry, it will then stand extremes of temperature without damage.

I would also advocate, both for those who practice field selection and those who do not, germination tests. I do not know how much you have done with germination tests, but you can do it in small shallow boxes. Take a box and mark it off, put in about two inches of dirt in the box, and then draw strings carefully across the top in both directions, so that you divide it into two-inch squares. And then start at the upper left-hand corner, and number them 1, 2, 3, 4, 5, 6, 7, 8; 9 and 10, etc. Into each of these squares put seed from one particular ear, and either number the ear so that you can identify it with the square into which the seed is put, or else tie a string around it in some way so that you can identify it. By then keeping a careful watch of the box you can get a very good idea of the germination qualities of the different seed. The germination tests will pay. I have done it many times with a student helper, and I have been enabled to tell whether I am going to get ninety-eight per cent. of my corn to the acre, or whether only about fifty per cent of it will grow. It is a very important point, and the tests can be carried on so simply, that it is something that I recommend to you all.

Now, then, just a suggestion that I want to make with reference to the selection of corn for improving the varieties of corn that we have in Connecticut. Of course, you know in Illinois they have paid a great deal of attention to these different questions in regard to corn and the Illinois Station has issued considerable literature. I was there in 1906, and among other things they had a plot of high-eared and also low-eared corn. That is, they had selected an ear that was high and also one that was low on the stalk. They carried that on for a number of years. The high-eared corn had become low, and the low-eared corn had become lower. There were more nubs (?) between the ground and the ear. The high-eared corn was later, but although the low-eared corn was a week earlier their results showed, as published recently, just as much corn was produced on the low-eared plot, but it was on smaller plants, and it was a week earlier. It seems to me that there is a suggestion for us in New England, because it is universally the fact that if you reduce the number of nubs between the ground and your fruit, you will get an earlier fruit. The fact that they did not reduce their yield, it seems to me, ought to be of assistance to us. We can get a smaller plant with a larger ear, and that is what we should select for. I want to say in this connection just a word about fertilizer. Most legumes are good in the preparation of a corn field. Corn can be raised simply on fertilizers, and can be raised densely, as has been shown by the Rhode Island

Station, but it is certainly advisable not to do it. I do not know of anything that is more valuable on the field than legumes preceding the corn crop. Any of the legume plants are valuable. A legume that you sometimes use on your tobacco field, and a good one, is winter vetch. Farmyard manure is good so far as it goes. We can use farmyard manure as well as fertilizers. We use a small amount of farmyard manure either the first or second year. With us, the general custom has been, so far as rotation is concerned, to put on about two crops of corn, then two or three years of grass. The first crop of corn we cut for green corn and the second crop we put into the silo. It is possible to raise corn simply on fertilizers alone, but I think it damages the land, and the better course is to adopt the principle of rotation. In the end you get a better result.

Now possibly what I have said may remind you of the old story of the boy who had a new brother. The nurse took him in to show him the new arrival, and he said, "That baby has not got any hair." "No, Johnny," said his mother, "no hair yet." "Why, mother," he said, "mother, that baby hasn't got any teeth." "Why," he says, "I believe we have been stung. I believe it is an old baby." (Laughter.) Well, I cannot help feeling that these few points that I have gone over in connection with the corn crop seem like an old story to you, and yet I do think, gentlemen, that if we will pay more attention to this old story, we will get a much better yield of corn.

I think perhaps I had better let you ask any questions that you wish, and not attempt to talk to you further. I will not guarantee to answer your questions, but I will be pleased to tell you what I can.

The PRESIDENT. We would like to have the audience ask any questions they may think of.

QUESTION. Wouldn't you advise four stalks to the hill.

Professor FORD. On extremely fertile land that might not be too much, but for the average New England soil I should say three was enough.

QUESTION. Would you take last year's corn in preference to this for seed?

Professor FORD. I do not think I would in preference, but I think it is a pretty good plan to keep a little of last year's corn on hand. I think you will find that last year's corn will be a little bit earlier in maturity.

QUESTION. You think that four stalks to the hill is too many?

Professor FORD. Well, as I said, it depends something on the variety that you are raising, and also on the fertility of your soil.

QUESTION. Professor, won't you go into that question of the adaptability of the Flint and Dent corn to New England?

Professor FORD. We have not carried on any long series of experiments with reference to that, as they have in the western states, but I think what I stated in my talk has been borne out by the experience of most growers in New England.

QUESTION. On my place we used to say to plant five or six and thin to four stalks to the hill. I think that was my father's rule.

Professor FORD. Well, I think very likely you got as good a yield in that way. It reminds me of an old gentleman in the town where I was born. He believed in putting in plenty of seed. He said he wanted two for the crows and two for the crop and five for old Charles Watkins.

QUESTION. Do any investigations, Professor, tell how to keep the crows off.

Professor FORD: Well, that is a very practical question. I think a little gas tar is perhaps the best thing to use. There was a bulletin published by the Illinois Station recently recommending the use of gas tar and water, the proportions being about two tablespoonfuls of tar to ten quarts of corn. They tried to test it in different ways by feeding it to hens, but the hens refused to eat it. We have used gas tar on our corn, and we planted it by a machine. The crows pulled it up quite a little, but I do not think the crows eat a great deal of it. They find it is not very palatable. I think we can do a great deal by feeding the crows a little corn on top of the ground; that is, by putting it where they can pick it up, and in that way keep them from pulling the corn. They will not pull it if it is on top of the ground. I think the presence of crows in a cornfield helps to destroy a great many insects, and if they find some corn scattered around over the field it helps to keep them from pulling the corn.

A MEMBER. The corn has got to be scattered on the ground before you plant the corn. The crows have got to find it there before they get started pulling. If crows once get started pulling corn there is no stopping them, but if they are fed with corn so that they can pick it up before the corn comes up there will not be so much trouble.

A MEMBER. We have been using coal tar. We do not use any water, but just put in a little tar and mix the corn up in it. Some people stir in a little plaster. The crows never pull that but once. They do not like the taste of it. I would like to ask the speaker if you are planting much of the large yellow corn.

Professor FORD. In Massachusetts we are using the Leeming corn, which we buy in Illinois, that is, for raising corn for silage. We are also using a medium-sized white Dent corn.

QUESTION. Professor, there is one thing which I have been using to prevent crows from pulling corn that has not been mentioned. My experience has been that you can get something better than putting tar on the corn, because unless you get on a sufficient amount of it, the crows seem to like it, and they will pull it up and grow fat on it. The only way that we have headed them off is to use poison. We take a bushel or so and throw it broadcast over about ten acres. A bushel or two will do it. We buy thirty-five cents' worth of strychnine and soak that corn, put some strychnine into it, and sow it over the field. They find it and you will find them dead in the woods. I do not like to kill them, but I cannot help it.

QUESTION. Have any of you ever tried that preventative that Theodore Sanderson advertises extensively, called "crow-killer," or something like that?

Professor FORD. No. But I would like to ask the gentleman who has used strychnine whether he has ever tried sowing corn on top of the ground. In Massachusetts we are not allowed that method. The crow is a valuable aid in keeping down insect pests, and for that reason I think should be protected. I know in our section a good many good farmers are successful in preventing their corn from being pulled up by crows by sowing some on top of the ground.

A MEMBER. Well, if I have been doing something that the law prohibits, I shall certainly have to continue doing it until

I can find something that will protect my crop. I have tried that method of sowing corn on top of the ground, but Connecticut crows do not seem to be very decent crows. They will eat that all up and eat the other too.

A MEMBER. A few cents worth of coal tar to the acre will guarantee a piece of corn against the crows almost every time. That has been my experience. I have tried it for fifty odd years, and never worry about the crows pulling the corn. One thing, some people often get on too much, thinking that they will not get on enough. I do not think that it hurts the corn or hurts the germination, and even if you do get on a little bit more than is necessary, it will keep the dampness from it.

There is another question that I want to ask the speaker. I notice by the exhibits here today that the increase seems to be in favor of the Dent variety. I was wondering if that was becoming more and more so. I noticed in the large exhibit here today that the Dent corn seems to be the favorite. I am in favor of the Dent corn because I have raised it for fifty years, but I got out of it on account of a poor year, and I had to look around a good ways before I could find what I wanted for seed again. I am satisfied that the Dent corn will produce from twenty to twenty-five per cent. more shelled corn to the acre than the other in this locality.

Professor FORD. With reference to the Dent corn, I think there is more Dent corn raised in New England than there was a few years ago, and I believe too that you can raise more per acre, but if you are on poor land do not plant more than a small piece to start with, because I believe there are farms which are not adapted to it, and in such places it is well to try the character of your soil before you select the variety.

QUESTION. Can the Professor tell us something about fertilization? I should like to know what his views are about some of this land that is used for corn in these rough hill farms.

Professor FORD. Your success with a particular piece of land, I think, depends entirely on the preceding treatment that you have given to the land. I might say with reference to the kind of fertilizer to apply that Professor Brooks has made some experiments along that line. In all of the different counties of Massachusetts where he experimented he applied nitrogen, phosphoric acid and potash. The potash gave an average increase of about fourteen bushels of corn, the phosphoric acid gave an average increase of about four bushels, three and six-tenths, and the nitrogen four bushels. So that the potash gave nearly twelve bushels of corn over the plot where no manure was applied, and was evidently the element needed for the fertilization of the ground. Potash is an important element to put into the average soil, and is a great help to a corn crop. The same thing was true of stover. The potash gave an increase of 1,300 pounds, whereas the nitrogen gave only 389 pounds of increase. With reference to fertilizers, we use phosphoric slag, high-grade nitrogen and nitrate of soda.

QUESTION. Do you apply that broadcast or in the hill?

Professor FORD. Theoretically, it should be applied broadcast. We have a man in Amherst who is a good farmer, and he says that he has noticed that he has gotten much better results by sowing a part of his nitrogen after the plant starts, and that you can get some advantage from the sowing of the nitrogen broadcast along the row, not exactly in the center of the row, but near the plants after the plants are up four or five inches. We should apply about one or two hundred pounds of nitrate of soda, and perhaps five hundred pounds of phosphoric slag, and from two hundred to two hundred and fifty pounds of potash. Of course, that is a very fertile farm. With reference to the slag, you will not get a very big return the first year. It does carry some lime, and, of course, lime is valuable. We need to use more lime for clover, and, of course, clover is one of those crops that is useful to rotate with on land used for corn growing.

I am very glad to see that Mr. Walker of Kentucky is going to talk about alfalfa tomorrow. We can raise it here if we only keep at it and learn.

QUESTION. How do you get rid of mice that eat the corn in the ground?

Professor FORD. Well, you have in this State an Experiment Station, to which is attached, undoubtedly, an officer called a biologist, and I should refer that mouse question to the biologist of the Station.

QUESTION. Professor, I understood you to say that crows were valuable. What are they good for?

Professor FORD. I think you will find that when you kill one on your corn field you are killing a friend. If you open the crop of a crow, you will, undoubtedly, find a great many insects, and the insects that the crow consumes would, if left to grow and mature, do more damage than the crow would. I believe it has been definitely proven that the crow is a good thing.

Mr. Hoyt. Crows will walk over the field and pick up insects, but I believe if it was not for the tarred corn we use they would not feed on the insects. It makes them feed on the insects.

Question. What do you mean, Professor, by phosphoric slag? I would like to ask whether it is South Carolina rock or something else.

Professor Ford. It is something else, by-product, or sometimes called Thomas slag. It is a waste product which contains considerable lime as well as phosphate. I think our slag contains about eighteen per cent. of phosphoric acid.

The President. Now if there are no further questions to be asked of Professor Ford, our next speaker is with us. This is his first visit to the far east. He arrived in this law-abiding town at the unseemly hour of three o'clock in the morning. He found hardly anyone at the station, and no carriage there, and you can imagine the trouble he was in in not knowing where his hotel was located and with no one to ask. I want to say that while we are a law-abiding people and keep early hours, if there was anything to induce us to stay up late it would be to meet a man from Kentucky on his first visit here. Now he is to talk to us on corn culture, the selection of seed, etc., and I know everyone here will be interested in that, because we all know that they raise good corn in Kentucky, but it all goes into whisky, and you know the reputation of Kentucky whisky. I take great pleasure in introducing Colonel J. B. Walker of Hopkinsville, Ky. I call him Colonel, because I never dare to introduce a southern man by any other title.

CORN GROWING, SEED SELECTION, PLANTING AND CULTIVATING.

By Colonel J. B. Walker, Hopkinsville, Ky.

Mr. President, Ladies and Gentlemen: Really and truly, I do not think much of a title won on a bloodless battlefield. All the battles I have ever won have been with Mother Nature. I did not win all. I have had quite a number of failures.

I come before you this afternoon in a spirit of helpfulness from the far south, where the soil and the climate is so different that I feel that I may not be in reality very helpful to you after all, but nevertheless there are certain underlying principles with regard to the cultivation of corn which obtain everywhere. Corn is one of the most extensively raised crops that we have. The previous speaker has covered the ground pretty completely, but it seems to me there are some points which can well be emphasized, and I am going to touch upon a few of his points. Now, mark you, I am not here to tell you how to grow corn in Connecticut, but I am here to tell you how I grow corn in Kentucky. I returned last Saturday after a campaign of eleven weeks in this kind of work in the west, and during that time I talked more than three times every week. So you can see I am rather used to the business, and if any of you want to ask any questions while I am going along you will not throw me off or disturb me in the least bit. You need not wait until I finish. I sometimes talk quite rapidly, and you may not catch what I say. You may think it worth while to catch it, and then is the time for you to ask the question.

Now, gentlemen, the preceding speaker told you that the first necessity in getting a good corn crop was to get a good stand. Now I go just a step further than that. What he said was all right. That is a good rule, and we cannot get a good crop without it. But I want to go just a step further. I have been on farms in Kentucky where eighty-five per cent. would be stalks, that is, there would be only fifteen per cent. shy on the entire field. Now some of you might think that was a good stand, but it does not necessarily mean a good stand because you have got eighty-five per cent. of stalks there. You might find in that same row ninety-five talks, and at the same time you might find only sixty-five of them carried an ear. If a stalk does not carry an ear, you will not get corn. You want the stand, but at the same time you want productive stalks. What the speaker said with reference to selection of seed corn was good. I want seed corn that has productive vitality. It makes a great deal of difference whether seed has reproductive vitality. It may have vitality enough to come up, that is, it will start to come up, but may be lacking in vitality to such an extent that it will only produce a little bit of a weak stalk. Now that stalk is not only non-productive, but it is apt to be a decided harm to you because the pollen from such a stock will be apt to fertilize good stalks, and thus inject an injurious element. I am going to tell you how we select it in many parts of the country. We have brought the average corn crop up this year quite a little above what it has been. You average here in Connecticut about forty bushels, according to the year-books, while ours is twenty-six. You beat us to death. But the time is coming when you are going to do better. Now when we select our seed corn we go into the field in the fall of the year, and we try to find ears that hang down a little bit. We want that ear to hang down, because an ear with that characteristic will drain the water off. That is the first point. Now what kind of stalks do we want? We want one that is large at the base, because that is a sign of strength, and it is not so easy to blow down. Then we want one with good broad leaves, because the leaves are the lungs and stomach of the plant. Unless you have got good leaves you cannot produce a good crop. Now what kind of an ear of corn do we want? Obviously one that will yield the most bushels of corn per acre. We hear of ears of corn weighing sixteen ounces and fourteen ounces, and, of course, that is a good corn to raise, because the percentage is high, it will take a less number of ears of that kind of corn to make a bushel. The gentleman who preceded me advocated raising which would produce a trueness to type. That was a good point. If you can raise corn of a type which will produce large full well-developed ears, weighing as much as that it is a good kind to raise. In the locality in which I live we raise our corn for feed and to seed. We do not sell much corn that is raised in the Ohio River valley, or on the Tennessee river bottoms. In other portions of our state, they raise corn largely to sell. They grow yellow corn and sell it to the distilleries. We make a great deal of our corn, as the President said in presenting me to you, into whisky, but that does not mean that we all drink whisky in Kentucky. (Laughter.) I never took a drink in my life, I never did, and I don't expect to ever have to.

Now there is another thing that contributes to the growth of a good corn crop, and that is the surroundings. I will tell you this because the gentleman preceding me did not dwell on that. I think he was very kind to me, and thereby kind to you, but he evidently thought that it would give me an opportunity to say something. Suppose you find two stalks standing in a hill, one a nice, thrifty, vigorous stalk, a stalk which is sure to give a good yield, and standing right alongside of it there is one of these little shriveled up, shrunken fellows that will not produce any corn at all. Now don't take a seed ear from that healthy looking, vigorous stalk, because the pollen from that little bit of a stalk has fertilized its good ears, and the parentage of the corn that you would get from a stalk of that kind is not good. The pollen from that small stalk has been very apt to have a deteriorating influence. Now after we have selected the seed, the next thing to do is to take care of it. I am not going into the question of the selection of the seed to any great extent, because the gentleman who preceded me has referred to most of the points. We take care of our corn seed. In most of our farmhouses in Kentucky we have big kitchens, with a ceiling overhead. We take this seed corn and tie it up together in small bunches, tie it up in such a way that there is plenty of air space between the ears. The shucks are all removed. Then the corn is hung up in these places where it is warm and dry. There is a fire in that kitchen three times every day, and the warm air goes up over and around that corn and keeps it dry. When it is kept dry it is not affected by changes in the temperature. Now then after keeping our seed in that way, when we get ready to use it, we take it down and try it out in the testing boxes. The gentleman who preceded me referred to the testing boxes, and I am sorry he did not dwell more upon that point, because it is one of the most valuable things that a farmer can have. I brought my yield of corn up from thirty-five bushels to the acre to eighty-six. That is an actual occurrence. Last year we made about eighty-six to the acre, but this year we made only about eighty. My testing box will hold three hundred and twenty ears. This is the way I work. For example, here is an ear of corn in a certain lot that we will suppose will make good seed. I put this up in the left-hand square. Then I punch a hole in the end of it, and put a piece of paper in there so as to mark it. In that way I go over all of my sample ears, and, as I said before, my box holds just three hundred and twenty ears. Now there is no better means known for finding out just what the germination power of your corn is. Farmers, a good many times, do not do just as well as they know how to do, but I know with me it is an important matter to get good seed, because I plant sixty acres of corn annually. I do not expect Connecticut people do much better on that line than we do. Now at the end of four days we take the cover off that box. Suppose there are six grains in a certain square, and we find that four of them have got good long sprouts on. Then we will find two that have not got more than two sprouts. Suppose you did find four good vigorous sprouts. Well, what does that mean? Why, it means simply this, friends. It means that that particular seed is just about one-third better than the other. In other words, if those four grains would make that growth in four days, it follows logically, does it not, that you will get much stronger plants from that seed than you will from the other in a season of one hundred and twenty days? And you want plants with good strong reproductive vitality. Now I think I have said enough on that point. If you want to ask me any questions about it now is your time.

Now as to the preparation for planting. My opinion is that if I lived in Connecticut I would break my land in the fall. Do you do that here? Well, some of you do and some of you do not. I break my land with a three-horse plow. I suppose a good many of you people in Connecticut break your corn land in the spring. We do not break our land in the spring because our winters are open and warm, and the erosion of the soil during the warm months of the winter is terrific. For that reason we try to keep something growing on our land in the winter season. I think it is a good plan to put on some crop like clover. What my friend who preceded me said about the use of legumes on corn land was good. Now I go on to that land in the spring just as early as it is dry enough. My land has already been broken up or plowed. I go on with a disc harrow that stirs up the soil. We go over it both ways two or three times, cutting it to the depth of about four inches. In that way we mellow that land and get it in good shape for planting. You set up capillary attraction. Now corn takes its food in liquid form by capilliary attraction. It takes three hundred and five pounds of water to make one pound of dry matter in corn. And you want to conserve the moisture in your land. Now when this land is ready for planting, we plant corn in hills three feet and eight inches apart each way. We plant our corn with a planter, and we set our planter to plant three corns to the hill. The machine will drop just what it is set to do from eighty-five to ninety times out of a hundred. We neither thin nor replant. We cannot afford to thin the corn, and we cannot spend the time to replant the corn. Thinning corn is a hard proposition in any case. In addition to that we do not want to replant. Now the corn is planted in that manner at the rate of from fifteen to eighteen acres a day. Cultivation comes next. Immediately behind this planter we run a roller, because there is more or less little clods of ground, and we want to get rid of these clods. Next, they are full of weed seed, and may germinate before your corn, and they will start ahead of your corn. Now the way to get rid of weeds is to kill them quick. If a weed gets a hold in the corn field you have got something to do to kill it. We go over the field in that way and break these open, let in the sunlight and they perish. Immediately behind the roller we run the weeder. Now do you use weeders here? I use two twelve-foot weeders, and with a machine of that type we can go over sixty acres of corn in one day. A weeder needs to be used right at the time when you need it. If you wait two days too long your work will be wasted. Now we run the weeder until our corn gets to be somewhere from eight to ten inches high. We want to make as much corn as possible, and we can make more corn by going over it often. We can hire a boy to drive the mules for sixty cents a day and board. Now when the weeders go out, we put on a spring-tooth cultivator. Our spring-tooth cultivator carries five little teeth on each side, and that is passed up and down over the field. We do not want to disturb the ground to any depth, certainly not to a depth greater than two and one-half or three inches. There are two reasons why we do not want to get down too deep. The first reason is that the roots of the plant are apt to be injured, and we do not want to destroy those roots in any way; and the second reason is that we do not want to bring up any weeds from beneath that may germinate and come up on us. Now we run this spring-tooth cultivator until the corn get about that high, and then we put on a little fourteen-toothed cultivator. If you follow that method of cultivating your corn you do just exactly as we do at home. We do that to conserve the moisture and to kill the weeds. Now that implement has a tendency to throw the earth just where it is needed; and does not injure the roots. You are leaving the moisture in the land, and that is what is needed to produce corn. After we have gone as far as we can go with the spring-tooth cultivator, when the corn is up about so high, we put in this cultivator. We do that in order to kill the last weeds that may appear on the land, because our land is always full of the seed, and it is absolutely necessary for us to keep them down. We keep that process up until the corn reaches a height where it is impossible to get in without injury. Now, Mr. Chairman, I have described our process, and I think perhaps any other points that can be brought out can be brought out by questions, and I may be able to be of more use to you in that way.

The PRESIDENT. There must be some questions.

QUESTION. Do you use the weeder all the time one way, or do you cross the field with it?

Colonel WALKER. We go both ways. The first time we run the weeder out we run it as though there wasn't corn there. When it does get up we run both ways. We go over it twice if we can. I have one twelve-foot weeder without wheels. I just as soon use it without wheels.

QUESTION. Doesn't that depend on the size of the farm?

Colonel WALKER. You can turn the land with one without wheels just as well as you can with wheels, and you can get just as good results with the weeder. I would not buy one without wheels.

QUESTION. Do you fertilize?

Colonel WALKER. Yes, sir.

QUESTION. About how much do you put on?

Colonel WALKER. Well, gentlemen, I am about the worst crank on that subject you ever saw. Twenty-three years ago I bought a farm of about two hundred and ten acres. I am living on it yet. The neighbors said that the soil was so thin that they were afraid to hunt over it for fear that they would break through. I never used any commercial fertilizer on that land, but I used barnyard manure, clover and then white clover in rotation. I do not want to have you get the idea that I do not use some fertilizer aside from barnyard manure, but I do not use anything but floats, Tennessee floats. It is a sort of companion to the slag, with the phosphoric rock that is ground into fine form, and we can buy that for $6.60. In our locality we can get it for that price, and I can get as much fertility out of that, even at a higher price, as I can with about ten times the amount of commercial fertilizer. The point I want to make is this. Our land is very shy in phosphoric acid, and the application of this form of fertilizer has proven very beneficial. With that treatment we find that we can grow cow peas and other legumes well, and we go into those to considerable extent. I have used that now for some time in connection with barnyard manure.

QUESTION. On those Tennessee floats that you speak of, how much do you pay a ton for it?

Colonel Walker. We pay $6.60. I presume it would cost you more up here.

Question. You think that is a good thing to buy?

Colonel Walker. Unquestionably. Of course, the freight rate would make it more here, but I do not buy any nitrogen, because that is a most expensive thing to buy.

Question. Mr. President, I wish the speaker would explain a little more about his cow peas and soy beans. When do you plant them?

Colonel Walker. We plant the soy beans anywhere from the first to the tenth of June. They are a crop in themselves. We can use them in several different ways. We can either pasture them and keep them down in that way or make hay. They are very beneficial on the soil. The roots tend to gather nitrogen, and we can fertilize that in the following crop. We grow quite a good deal of soy beans and also of cow peas. I suspect that they would be a little too slow for you people up here.

Professor Ford. We raise a few acres of them in Massachusetts.

Colonel Walker. Professor Ford says they raise a few acres in Massachusetts, and I think it would be wise if you would get some of the seed from him. If you ever grow them, feed them to your dairy cattle and to your hogs. They are rich in protein.

Question. Do you raise crimson clover?

Colonel Walker. Yes, sir. We sow in August and early September, and cut in the following May. If you let it go too long, of course, like any other crop it is not good. A great many sow it in August as a cover crop, and then they plow it under and sow phosphoric rock. That mixes very well with the decayed vegetable matter in the soil, and the combination is immediately available for a crop. The people in my vicinity find that a very profitable thing to do. They also grow rye for the same purpose.

Question. Do you think that crimson clover makes a good feed?

Colonel Walker. Yes, sir.

Question. Do you recommend giving it to all kinds of stock?

Professor Ford. I had a little experience with crimson clover. A man lost several horses, and it was a puzzle to know what the trouble was. After some investigation it was found that the trouble was that those hard heads had formed bunches in the intestines. I do not think you will find that trouble in feeding it to cattle, but in feeding it to horses that trouble has sometimes arisen in the alimentary canal and the stomach. That subject was investigated some time ago by the United States Department of Agriculture, and that was found to be the trouble.

Colonel WALKER. I do not think you would run any risk in the silo, but we do have cattle killed by it. We do not grow very much of it. I grow mostly alfalfa and soy beans.

QUESTION. To go back again to the question of corn, I would like to ask the speaker if he can give us any idea about what per cent. this weeder that he speaks of destroys.

Colonel WALKER. I was talking up in Illinois a while ago, and there was a gentleman that sat right in front of me. I made this statement, that I could run a weeder right through a lot which would take the weeds out. " Well," he said, " do you mean that? " " Yes," I said, " I mean that." " Well," he says, " that looks rather improbable." I said, " Don't you know, my good friend, that there are lots of things that look improbable, but which nevertheless are true? Don't you know that people at one time refused to believe that the blood circulated? They would not believe it." Well now, it is just so in talking about weeds. You can do it to a very great extent with the weeder. You may break a stalk now and then in going over the field, but the amount of damage you will do is far less than the good which results. The weeder does not disturb the corn roots. The corn roots are much deeper. Of course, the main purpose of the weeder is to break up the lumps and kill the weeds.

Now I will go back just about a minute. Some years ago along in June I had been down in the cornfield, and about ten o'clock I saw a gentleman ride up to the front door. The weeders were running in the field. The weather had been awfully hot and dry, but my corn looked pretty well. Well, I walked up along and met him, and we got to talking about the crops, and he says, " It is very dry," he says, " it is awful dry. My corn is all curled up with the heat." " Well," I said to him, " mine is not. Just come down and look at it. I have just come out of the cornfield." "Well," he said, "I think if you get in among it you will find that it is. I do not believe you noticed it." "Well," I said to him, "I do not think I should stay down there in the field four or five hours and not know if that corn was burning;" and so we walked inside the gate, and he began to look around. He looked pretty surprised, and finally he says, "What are you working this field with?" I told him I had a fourteen-toothed wheel weeder, and there were five running down there then. He examined some of the soil. It was almost stuck together. It was moist. "Well," he said, "I do not understand it. Don't those machines break off the roots and hurt your corn?" "No," I said. I scratched around and finally found a long root that had not been broken. "Why," he says, "I did not know that corn had roots that long. Well," he says, "I have not been pursuing the right method, and I am going right home and stop it." I do not know to this day what he came to my house for, but when we got up to the house he said that he wanted to go and telephone them to stop on his place, and then he wanted to come back and talk with me. Now those weeders accomplish a two-fold purpose. They break up the lumps, and bring the seed that is in them out into the sunlight, where they are killed. They stir up the soil and get it into proper condition for the corn crop to grow in.

QUESTION. How much stock do you keep on your farm?

Colonel WALKER. We have about thirty head of cattle, about twenty head of young stock and anywhere from one hundred to one hundred and fifty head of hogs. Besides that we keep a number of horses and mules.

QUESTION. Does that stock supply all the manure that you use?

Colonel WALKER. I am very careful to preserve my manure, especially the liquid manure. That is one of the most valuable parts of it. That is one of the things I take care of. And we save it just as religiously as we do anything else. If you are not doing it, the time is coming when you will all have to do it. We do not burn any straw. I do not know whether you do up here. My neighbors used to burn great ricks of straw. Some of them used to give them to me.

QUESTION. What time of the year do you apply your manure?

Colonel Walker. I apply it pretty nearly all the year. When I cut the wheat and get the wheat out of the way, why then we can begin to put on the stable manure, and to get ready to put on the clover seed. In other words, the sooner you can get your manure onto the field the stronger and more vigorous you can make that clover, the more power it has in it to help the crop. I do not want to get onto this question of clover and alfalfa. I am scheduled to talk tonight, and that will naturally come up in connection with that subject.

Question. Do you use ensilage?

Colonel Walker. Yes, sir, I have a silo. I could not keep all that stock if I did not have it. I am a firm believer in three things, the silo, alfalfa and good pasture.

Question. Which is the better crop, soy beans or cow peas?

Colonel Walker. I would rather have the beans, I think. They are easier to handle. If you cut them at the proper stage, they make a very good crop. The cow peas run all over creation.

Question. Your clover is put in, as I understand it, as preparation for your corn crops?

Colonel Walker. Yes, sir.

Question. It is grown with the wheat?

Colonel Walker. We sow this in February. Then we cut the wheat in June, and mow the stubble. Now that clover crop we cut and put a lot of it in the barn loft for the cattle and horses. Then the seed crop comes along. What I do with that depends on how high seed is. If seed is low, and money is rather plentiful, we do one thing, but if seed is high, why then we thrash those seeds and sell them.

Question. Is your farm stony?

Colonel Walker. No, sir.

Question. What would you do with a weeder if it was stony?

Colonel Walker. Well, not having worked a stony farm it would be a guess, and you can do just about as good a job at guessing as I can. You understand I do not know your local troubles. I wish I did. I might be of more help to you. I take quite a number of agricultural papers. I try to exercise my own judgment over what I read. I think some men carry things pretty far, and I would not attempt to follow those men, or those writers. Then again I may find another article, sometimes a couple of articles, out of which I can get enough with which, with my own ideas, to arrive at a pretty good conclusion. I believe in these days a man has got to keep in touch with what the experiment stations are doing, and it is a good thing for him to read the agricultural papers. The farm institutes are only experience meetings, and places where we learn from the experience of each other. If I do not find something here that will make me a better farmer and a better citizen I will be sorry.

QUESTION. You get quite a good many ears, don't you, for your silo, in raising corn the way you do?

Colonel WALKER. Yes, sir, we try to raise corn where every stalk carries an ear.

QUESTION. I suppose you are not troubled with frost down where you are.

Colonel WALKER. We are never bothered with it.

QUESTION. How do you utilize your stover?

Colonel WALKER. We just send it up and put it in with the rest of the corn. Every bit of our corn is utilized. Of course, a good deal of it goes through the shredder. We feed our stock shredded fodder. Alfalfa hay, soy beans, corn and barley.

QUESTION. Do you shred that corn before you put it in the loft?

Colonel WALKER. We just set the machine and run it all right through together.

QUESTION. How much barley do you grow that you use in that way?

Colonel WALKER. I grow about ten acres a year. I put in about ten acres of barley for the cattle and hogs. I can use that for pasture, you know. They eat the corn down, and then when it is ready to turn in, I can put them onto those fields. That helps out during the time when the other feed is a little short.

QUESTION. How do you pick the corn? You say that you snap it off the stalks. What do you mean by that?

Colonel WALKER. I mean that we just break it off the stalk and leave the husk on. We grind the shucks, cob and all. If we do not grind it all up we husk it. We throw the husks in the trough, and they eat them anyhow, so there is no waste.

QUESTION. It will not keep that way so well, will it?

Colonel WALKER. Well, it does with me. We break the corn off the stalks, leaving the husk on the corn. Of course, when we feed it to the horses, we pull the shucks off and leave it in the manger.

QUESTION. That is not green, that is dry, isn't it?

Colonel WALKER. Of course, if it was green, we would not feed it that way.

QUESTION. Do you feed corn to your mules green?

Colonel WALKER. Well, sometimes if we get short we may mix in a little.

QUESTION. Do you find that it is apt to cause colic?

Colonel WALKER. Rarely ever. I never lost an animal by colic that I know of, unless I lost one last Monday. There was one that the stable boy said was sick when I left. If that has died since I left for the north it is the only one.

QUESTION. You consider it much safer, don't you, to have it dry before feeding it?

Colonel WALKER. Oh, we always feed it dry. We would not undertake to feed green corn to the mules and horses unless it was an absolute necessity.

QUESTION. Do you raise any oats?

Colonel WALKER. Not much. My neighbors do, some of them.

QUESTION. You are too far south for that?

Colonel WALKER. No, that is not the reason. We can grow sixty bushels to the acre. My great trouble with oats is that they mold in the barn, and they require too much care to make them a profitable crop for me to try to raise. I can do better with something else.

QUESTION. Where you have a heavy clay soil, is it necessary to inoculate the soil in order to get good soy beans?

Colonel WALKER. It is not necessary to inoculate for soy beans. You want to get your land in good condition by proper treatment. You should have some lime. I use considerable lime, and also use the legumes to store up nitrogen. We use ground raw rock to a considerable extent. We put on sometimes as much as four thousand pounds to the acre.

QUESTION. What would be the result where you had broken up the ground in the fall and put on the lime in the fall?

Colonel WALKER. Well, I do not think it would do any damage. I put the lime on after breaking because it is heavy and goes down rapidly. I do not believe that you can put it on at a wrong time. If you put it on after you plow it will still help.

QUESTION. You sow your lime, do you, with a machine, or do you put it on by hand?

Colonel WALKER. Well, it is a difficult thing to sow lime satisfactorily by hand. I have a machine. I have a lime spreader. I had to come clear up here to Massachusetts to get one. I am using a machine that is built over here at Chicopee Falls. I have conducted quite a lot of experiments for the United States government, and I had to have a lime spreader. The one that I have just mentioned is a very good machine.

QUESTION. Do you like soy beans better than cow peas?

Colonel WALKER. Yes, sir. I think somebody asked me that question before. I like them better because they are better to handle.

QUESTION. To plow them under?

Colonel WALKER. No. If I was going to plow them under I would take the cow peas.

QUESTION. Is your farm a level farm or a hill farm?

Colonel WALKER. I have got a place of two hundred and ten acres. It is not a hilly farm; it is not absolutely level. It rolls enough to shed the water. I am about seventy miles from the Ohio River. There is no large river near me at all.

QUESTION. Your labor is colored labor?

Colonel WALKER. Altogether.

QUESTION. Do you find that labor reliable?

Colonel WALKER. It is the best that we can get.

QUESTION. What wages do you pay those colored men?

Colonel WALKER. All the way from ten dollars a month to forty dollars a month, with board. We always board the help. You could not hire a negro unless you boarded him.

QUESTION. Do you find that you can trust your men?

Colonel WALKER. They are the best for farm hands that we can get. I have had one negro ever since I was twenty-three years old. I would trust him as quickly as I would you, or any other man I ever looked at. This gentleman asked me about boarding the help. You cannot hire negro help in our vicinity without board. In Kentucky, or most any other place in the south, wherever you work a negro you have got to board him.

And when he gets through with you, he isn't going to eat any more until another white man hires him. We furnish these people a house to live in, fuel to burn, and we furnish them all the milk they want. They have a garden spot where they can raise their own vegetables, and all that sort of thing. You have got to deal with a negro somewhat differently than with other farm help. The average negro is always more or less of a child. If they lived to be a thousand years old they would not be any different. I have a little girl fourteen years old, and she is not as childish as some of those negroes on my place. They make good help, and we get along very well with them.

The PRESIDENT. Are there any other questions about the corn proposition?

Colonel WALKER. I can assure you, ladies and gentlemen, that I have enjoyed every minute of my experience with you this afternoon, and I hope that you have. I thank you.

Professor FORD. The Chairman has asked me with reference to shocking and planting silage corn in drills. We are planting silage corn in shocks and rows. We think we can keep the silage clean cheaper in the shocks and rows than we can in the drills.

The PRESIDENT. That concludes the program for the afternoon. It is only necessary for me to say that Colonel Walker is to be here tonight. I will now declare the meeting adjourned.

SECOND DAY — EVENING SESSION.

Convention called to order at 8:15 P. M., Vice-President Wilson H. Lee in the chair.

The PRESIDENT. This afternoon when I introduced Colonel Walker he said to me, "You should understand that I am not a public speaker. I am an institute worker." My reply to him was, that I never knew a colonel from Kentucky but what could talk in public, and talk well, and you that heard him this afternoon know that he certainly can, and you also found out that he was pretty well up on corn. We think we know something about corn ourselves, but we found out this afternoon that he knew something about corn, and something about the growing and raising of corn successfully which it was very beneficial for us to know. The Colonel's address on corn this afternoon no doubt will prove very beneficial to us. Now while he is an enthusiast on corn he is just as much an enthusiast on alfalfa, and I am sure that Colonel Walker will handle the subject of alfalfa, about which he is assigned to speak tonight, as interestingly, entertainingly and effectively as he handled the question of corn.

I take great pleasure in introducing Colonel Walker of Kentucky.

ALFALFA AND CLOVER GROWING.

By Colonel J. B. Walker of Kentucky.

Mr. President, Ladies and Gentlemen: This afternoon the gentleman who preceded me told a story. I told him at the supper table that he told the story that I wanted to tell tonight. Now it was not just exactly the same story, but the results are the same. We had in our county some years ago a young man who had worked on a farm until he was twenty-one. When he was twenty-one his mother gave him a birthday dinner. He told his father that he was going to leave because he was going to railroading. He did leave home and was gone quite a number of years. He finally became the general freight agent for the railroad company he was working for. He then made a visit home. Of course his people were mighty glad to see him. His father said to him, "In what department are you working, John?" "I am in the freight department." "Oh, a porter, I suppose?" "Do you get as much as a dollar a day?" "Yes," he said, "I get more than that." "Why, do you get as much as two dollars?" "Yes, I get more than that." "Why, John, do you get as much as possibly three dollars a day?" "Yes, I get more than that." His father looked at him with some incredulity, and he said, "Well, John, are you a-lying?" (Laughter.) Now I hope you people will not think that I am stretching the truth in what I shall say to you about alfalfa and how to grow it. Alfalfa is certainly a most wonderful plant. So far as latitude and longitude are concerned there is no sort of season why you should not grow alfalfa in Connecticut just as well as we grow it in Kentucky, or as it is grown in the west. If you do not learn to grow alfalfa it is going to be your own fault, and the man that stands up and says that it cannot be done will be crowded out of the way. I am told that there are people in Connecticut who are already showing you that it can be grown successfully here.

There are only three enemies of alfalfa, weeds, water and acid. Now I am going to be frank with you. Alfalfa is not the easiest thing in the world to learn how to grow. I have had thirty-two failures in my own efforts to learn about it. But do not let that discourage you. Nevertheless, that is the fact. As a man who has got something for his work with alfalfa I have had thirty-two failures, but I didn't have these failures all on my own account. The United States government wanted somebody to conduct experiments in Kentucky with alfalfa, and they applied to the Kentucky Experiment Station, and Mr. Charles J. Brown, who has charge of that part of the business, visited me and made arrangements with me to make the experiments. We have had thirty-two failures, but the United States government paid the bill. Now we are growing alfalfa, growing it successfully, and as the result of our experiments with it we have learned pretty thoroughly that weeds, water and acid are its three natural enemies, but there are a few other things that you must have to go with it to make it successful. You must have a fairly fertile soil, a well-drained soil, an alkaline soil and inoculation.

Now the first thing that I would advise is to select a good site. You want a site where the ground is fairly fertile and productive, and the better that site is the better your chances will be. Then when you select that site, the next thing would be to find out whether or not your water table was sufficiently far away. When alfalfa roots reach water they die. We have heard that the roots would go to water. Well, some of them are long enough, certainly. There is no sort of question about that, either here or elsewhere, but you cannot raise alfalfa on a wet or acid soil. Now if you will dig a hole in the earth five feet in depth, and the water should stand in it to the depth of one foot, you might be able to get a little alfalfa on that kind of land, but you would not get a lasting stand. I would rather go further away from the water than that, but if you cannot get any better land than that, I would sow it there, and take my chance. You know alfalfa is a native of eastern Asia. It thrives better on high land, and upon dry land, than elsewhere, and that has been the result all over Kentucky, and I guess all over the country so far as I have ever known. I know that has been the case in Kentucky. I have been in every county in our state but one, and there are 191 of them. You need not be afraid of stones. In fact, I think it would do well on some of the stony land that you have here in New England. I have no stone on my place, but in parts of Kentucky we have a lot of stone. I have seen alfalfa where the stone was scattered thick all over the surface and it was growing well. So stone need not bother you Connecticut people.

Now the next thing is the character of the soil itself. If your land is acid it will not grow alfalfa. It is a waste of time to try it. But how are you going to know whether it is acid or not? I will tell you. If you grow red clover abundantly that is a demonstration that this land is not acid. If, on the other hand, you do not grow red clover upon it, and in walking around you see green, these plants which indicate a sour, acid condition, such as most every farmer is familiar with, that is evidence that the land is acid, pronounceably so, and that land would not do for alfalfa at all. I do not know, of course, whether your conditions here are the same as mine. The signs are not always quite the same. Perhaps there are some men in the audience who can tell about that. However that may be, if a farmer in our state has any doubt whether the land is acid, all we have to do when we want to test our land is to take a sample of the soil and send it to the experiment station, telling them that we want them to analyze that soil, and that they will do without expense to us, except that we pay the transportation charges on the samples to Lexington. Now, I do not know whether your Station does that for you or not. How is that?

President Lee. I am not sure, but I do not think they do that here.

Colonel Walker. Well, let your Station do that for you. The President says he does not think your Station does that. If it does not, you should manage some way to find out whether your soil is right for alfalfa, for it is not worth while to throw away your money by trying to grow it on land that is not adapted to it. You can find out anyhow. You can have it analyzed by a chemist and pay for it yourself, and that is better than not having it done at all. You better do that. Now if you want that land tested, the land where you propose to put the crop, you better go onto it and dig holes in various places over it to a depth of six or eight inches, and then take that earth and put it together and take about a quart of that soil, or a sufficient amount of it to give a good sample, send it to the Experiment Station and tell them that you want them to analyze it and see whether or not it is acid, and if so, how much lime it is going to take to correct the acidity of that soil. I will venture that there isn't a finer state in the Union for getting lime than right here in the State of Connecticut. Lime is one of the principal things that you want in your soil in order to get a good stand of alfalfa. You must have it. I use tons and tons of it. You cannot get on any too much under ordinary conditions. As I told you this afternoon, when speaking about corn, if you put lime on, put it on and harrow it in. It sinks into the soil rapidly, and you want it to permeate the whole soil so as to get the result.

Now the preparation of the land is an important part of the process in the successful growing of alfalfa. The preparation of the land plays a very important part because in the preparation we get at the root of one of the principal difficulties, and overcome it to some extent, namely, the growing of weeds. Weeds are the bane of alfalfa. The alfalfa plant when it first comes out of the earth is a most tender, delicate plant. After it has got its growth it is tough and hard to kill, but when the alfalfa plant first comes up it is a very delicate plant indeed. I sometimes liken it unto an infant. An infant is a most helpless creature. It cannot accomplish anything for itself. It has to be nursed and cared for by others, protected and cared for, until it gets strong enough to do for itself. So it is with alfalfa. When it reaches maturity and gets its strength then hardly anything can crowd it out, but when it first comes up, if the soil is weedy, the weeds having a rapid growth, are very apt to stifle it and kill it. That is about the only thing that ever hurts it for me. Now you should go onto that land in the spring and begin to prepare it just the same as you would for any other crop. If you take the land in the fall, it does not need the same handling. It ought to be prepared so as to prevent the growth of the weeds, so that when the seed is sown for your alfalfa crop, and the young shoots begin to appear, they will not be crowded out by a rank growth of weeds. That is one of the main points. Keep the weeds down. Keep them out of the land all you can, and let the strength of the land go to your alfalfa plants. Now when you have turned that land over in getting it ready, harrow it down and put on your lime. Whether you think your land needs lime or not, put it on. The chemists, you know, used to tell us that lime was not absolutely essential, and some of them used to say that lime was not a plant food. We had a chemist in Kentucky whom we loaned to California for a couple of years. Somebody asked him this question: Why is it that you chemists say that lime is not a plant food? And his answer was that that was an arbitrary statement, that there was lime enough. But there was not. Lime helps your land, and it is a great element in the successful raising of alfalfa. Now then you break that land up and work it down, and work it over a few days to kill the weeds. If you kill them as fast as they germinate then the weeds are eliminated. Do not plow that land up again. I had a friend in Kentucky. I came past his place one day, and I noticed him and his men out in the field where he had three big teams in there breaking that land up again. I asked him what he was doing that thing for. I asked him why he didn't put it right back into alfalfa. He said that he did not have inoculation enough, and he said that his idea was that if you did not have inoculation enough not to apply it artificially and then sow the alfalfa, because he thought if you kept on sowing the seed it would take care of itself. Well, that is not correct, of course. You must have the proper amount of inoculation in your soil. I passed on after talking with him, and in a day or two he came to my place and he says, "I have been thinking this matter over, and," he says, "I am going to take your advice. I want to borrow your lime spreader." He prepared his land and then sowed his alfalfa and had marvelous results, as good as anybody. Now talking about inoculation, if your land is not naturally inoculated, you must supply it with artificial inoculation. I want to tell you about one particular case at home. One of our Congressmen down there, one of the wealthiest farmers in Kentucky, started to raise a piece of alfalfa. The trees had been cleared off of the land, and he got that down in condition and sowed it to alfalfa. He got a fine piece. Now that simply showed that the conditions were naturally all right. He did not need to do anything, but that is not usually the case. You have usually got to supply inoculation. You cannot get good alfalfa without it. There is no success in alfalfa raising without inoculation finally. It cannot be done. Now when you put the inoculation on the land, when you sow it on the land, sow it broadcast, and then harrow it in a little, because the sun will kill the bacteria contained in the inoculating earth if you leave it exposed, and you do not want that to happen. You want to put that on a few days before you sow the seed. Some of you may want to know where to get that. The best plan for you to pursue is to let your Station advise you about that, but if you cannot get it in any other way then do this. Do you grow sweet clover in this country? If you do, that gathers the nodules which contain the bacteria you need, and if you can get the soil from a sweet clover field it answers every purpose. Or, if you will write to the Department of Agriculture and tell them you want some earth to inoculate an alfalfa field they will send you some. Twenty pounds is enough to sow an acre. You do not want above that the first time. But some of you farmers say, perhaps, if it is such a good thing why not sow twenty acres? Well, that sounds reasonable, but I will tell you this. The chances are just about eight times out of ten that you won't succeed the first time, because you will not do as well as you have been told, so it is well to start with a small piece at first. I suppose it is just the same here as it is in Kentucky, and that is about the way it has turned out with us. The New York experiment station reports that they have grown it in about fifty different counties in the state. Your land here in Connecticut in many respects is like the land over there, and you are subject to pretty near the same climatic conditions. Their station conducted an investigation, and they found that the farmers in New York state, where they did not do anything to prepare the land, succeeded in getting a crop about one time in five. Where they inoculated they succeeded three times in five, and where they inoculated and put on lime both they succeeded four times out of five. But that was only on one acre.

Some farmers have failed to get a good stand because they did not stick to the same site. When you once get a field inoculated never change. If you can, stick to the spot and never change. That is where so many men have lost out, because when they have tried it over they have tried it on another place where the soil was not sufficiently inoculated and they have failed. If they had stayed on that site where they commenced they would have succeeded.

I was riding the other day with some gentleman who had been shown a patch of alfalfa, about which they were telling me. A part of it was in splendid condition, but as to the remainder, why, they said there wasn't anything there at all. The owner got a man to come and investigate, and the result was that they found that some thirty years ago the land had been inoculated, or a part of it was, and that accounted for the fact that the growth was so successful on a portion of the field.

We hear statements sometimes about nursing the alfalfa. Some people laugh at the idea and say, "Well, I can't understand why anybody should say that such a rank growing plant as alfalfa should need to be nursed." Some advocate sowing barley or oats to nurse the alfalfa. Well, the question is, whether you are growing barley or oats or are growing alfalfa. If you are growing alfalfa, then your barley or oats are out of place. Well, I know the advocates of that say that they do that to keep out the weeds, and that these crops, or whichever one you put in, affords the alfalfa protection. Very well, but if that is the case, any other crop would give just about the same protection to the alfalfa, and if the object is to prevent a weedy field, that can be accomplished in another way. I don't think we want any nursed crop. Spring seeding is liable to be weedy. In our case we do not want to sow it before the tenth of August if we can help it, and we do not care to sow it later than the twentieth. We never sow it before the fifteenth of July. If we sow along in that portion of the summer that gives it an opportunity to get up and into good shape before it goes into winter quarters.

How much shall we sow to the acre? Some say fifteen pounds, some twenty, and from that up to thirty. Uncle Sam always says to sow twenty pounds. I never found it any too much. It gives me very satisfactory results. I have never sown any more. When I sow this alfalfa in July, I sow it on land which has been thoroughly prepared and worked all summer long, and which is producing very few weeds. Your season here, I imagine, is some later than ours, and you will have to be guided by that a little. The principle is the same though, to have the land prepared, thoroughly prepared, well worked over to keep out the weeds. I think it is a good plan to go over it every few days where you can. It helps to germinate the weeds, and to get rid of them, and it helps to get moisture into the soil. I was home last Sunday, and saw a piece of four and one-half acres that I sowed in August, and it was about eight or ten inches high, and looked fine. You want it to come into winter quarters with all the growth possible. If you get it through the first winter why then you are almost sure to get a successful crop. There is mighty little chance of failure, provided other necessary things have been attended to, if you get the crop into winter quarters with a good growth.

Now if the alfalfa begins to turn yellow, don't be alarmed too quickly. That may be due to either one of two things, either that it needs lime, or that it needs inoculation, but that is not always the case. Sometimes it is hurt by cutting too early. Some farmers cut it a little too early or because of unfavorable conditions it starts to get yellow. Well, in the beginning, I don't think you want to mow such a piece as that the first year, or pasture it any either, and you will usually find that the next year when that alfalfa comes along it will be better.

Now I told you that I sowed about twenty pounds of seed to the acre. With us that seems to be about the right quantity to get a fine smooth stand, and then you want to cover those seeds with a very light harrow. A weeder is an ideal thing. I prefer to cover the seed with a weeder rather than to use anything else. The weeder covers them to just about the right depth. You can roll it if you want to. If you cover them as much as an inch the plants never will come out. Therefore do not cover your seed too deep. After putting the seed in, and covering it, going over with a weeder or a roller, or with a bush drag, which some of you Connecticut farmers use, then go off and leave it alone. It will take care of itself for a while.

The next spring when the alfalfa begins to grow the question comes up, "When shall I cut it?" That plays quite an important part. As I have already told you, if you cut it too soon it is bad, and if you cut it too late it is worse. Many people have said that it should be cut when about a tenth of the blossoms appear. Well, that is not a very safe rule to go by, because I do not know how many have appeared. There is a way to tell, however. Alfalfa has a habit, the plants themselves have a way of indicating when the time has arrived when the hay should be harvested. They send out a lot of new shoots, which start out around the base of the plant, and when they start out it is time to cut because the young alfalfa comes right on strong. If you cut it too soon, the alfalfa stand is very apt to be hurt, the growth is checked, and then weeds and other foreign matter get in and have time to choke and spoil the crop. On the other hand, if you delay it too long, then you get a woody, coarse, poor hay that is not of as much value for feeding purposes. It weighs more, it is true, but it is not as good to feed.

I have not said a word about pasturing alfalfa fields. A field of alfalfa makes an ideal place for hogs. The hay makes a splendid fodder for cattle or sheep, and some let their sheep run over it for pasture.

Now these processes that I have described, the preparation of the land, the inoculation, planting and making of the alfalfa hay, cover about all the points that I wanted to touch on, but if you want to ask any questions, why, I would be glad to have you do so.

QUESTION. What do you call sweet clover?

Colonel WALKER. Sweet clover is the kind which has a small yellowish white blossom. That is an ideal plant on poor land. It will reinvigorate the land and make it better every day in the year. You take an old abandoned farm and get that to growing on it, and it will make it better every day it is there. I have heard about the abandoned farms of Connecticut.

Secretary FANTON. We haven't got as many as we had.

Colonel WALKER. Your Secretary says that you haven't got any now. I don't believe you will have many when you farmers get to using alfalfa. Sweet clover doesn't make so good a hay, but if you have a field that is not productive, if you can get sweet clover to growing upon it, it will be of great benefit.

QUESTION. I did not know but what you called sweet clover was the ordinary red clover. We grow lots of that here.

Colonel WALKER. No, sir, what I call sweet clover is the small clover with the yellowish white blossom, and when you take it and twist it or crush it a sweet odor will exude from it. That's the only safe way I know of to tell it, because it will fool most anybody.

QUESTION. How does it improve the land?

Colonel WALKER. It carries some kind of bacteria that accumulate about the roots that seem to be very beneficial to the soil. Like alfalfa its roots penetrate the soil, accumulate nitrogen, and very tenacious of life. It will improve your land wherever it comes in.

QUESTION. Would it be a good thing to sow with the small grain in the spring?

Colonel WALKER. The finest kind, yes, sir. You could not do a better thing than that.

Doctor JENKINS. Mr. President, I should like to answer one question which was asked, in regard to the testing of soils for acidity by the State. The Station for many years has done a good deal of soil testing. The only difference between Connecticut and Kentucky is that in Kentucky you pay the express charges on the packages to the Station and in Connecticut they leave it for the Station to pay. We are always glad to test samples of soil for acid.

QUESTION. How much lime do you put on?

Colonel WALKER. All the way from fifteen hundred to four thousand pounds. If we use caustic lime we do not put on more than half as much as the raw. When it is burned it is caustic, and it is dangerous, because it burns the humus out of your soil. I prefer the raw lime rock because the raw rock will last longer in your soil and does not burn the humus. For that reason I prefer to use the raw rock.

QUESTION. How about air slacked lime?

Colonel WALKER. Why, that is the burned lime come back to its original condition; taken in air and taken in water.

QUESTION. Is it a good lime to use?

Colonel WALKER. Yes, sir. If you cannot get the raw rock or anything better, I should use that.

QUESTION. You spoke about the site for an alfalfa field. As I understand it, it does not want a damp, low land, but you recommend planting it on high land.

Colonel WALKER. Alfalfa is a native of Asia. There you find it growing on the mountains thousands of feet above the level of the sea.

QUESTION. Is it necessary to irrigate alfalfa to get a successful crop?

Colonel WALKER. In some of the arid districts in the west and southwest I believe they have irrigated it, but I do not think it would be advisable here. Of course, in some arid districts they do irrigate it and make a success of it for that reason. The alfalfa plant does take up water. Of course, its roots go down very deep. It doesn't dig down into the earth to get water, but, as you all know, the plant naturally has a very long root — I would be afraid to say how far they go down in some cases, because you would think that I was not telling the truth.

A MEMBER. The President says they go down thirty-five or forty feet sometimes.

Colonel WALKER. I have a friend who was in Amsterdam, Holland, and he tells me that he saw an alfalfa root there seventy-two feet long. I know he saw it because he told me about it. I would just as soon swear to it because I have known him all my life, and I know he is truthful. It is a common thing for the roots to go down thirty-five or forty feet.

QUESTION. How many years will it live?

Colonel WALKER. Why, I should say anywhere from five to twenty years. If water is sufficiently far away from it there is no reason why it should not last fifteen years. Of course, sometimes a disease attacks it, but if it has any enemy like red clover I have never come in contact with it. I have seen some over nine years of age, and it is as good now as it was the second year.

QUESTION. How do you fertilize the fields in getting it ready for a stand?

Colonel WALKER. You people up here I think should sow your alfalfa in July, so as to give it a chance to get a good growth a little while before the weather turns cold. In getting the field ready I should go over it with a manure spreader and put on about five loads to the acre over the top of the field. I would do that with young alfalfa even though it had a pretty good growth in the fall.

QUESTION. Have you ever tried wood ashes?

Colonel WALKER. No, sir; we do not use wood ashes because we cannot get them. I wish I had ashes. I would use them if I had them. We have no wood ashes because we all burn coal.

QUESTION. There are a good many brought in here from Canada.

Colonel WALKER. We can get floats which carry a large percentage of lime. We can buy these floats cheaper in my section. We do not need potash so much. I presume you get a good many ashes here.

QUESTION. How often do you cut your alfalfa crop? How many times can you cut it during the season without injury?

Colonel WALKER. Why, I should say from three to five times. We frequently cut it four times, and where it begins early in the spring, why we can get easily four crops. It depends somewhat on the season, but from three to five crops.

QUESTION. How many tons will it yield you?

Colonel WALKER. The largest cut I ever had was fifteen tons, or three tons to the acre from two cuttings.

QUESTION. How do you cure your alfalfa hay?

Colonel WALKER. Now you are getting around to haymaking. I do not want to monopolize the whole evening, because you have got a Connecticut man who is going to talk to you about alfalfa, and I presume he will take up that question of alfalfa hay. I make hay differently from what you do. You have heard the old adage that it is a good plan to make hay while the sun shines, but I do not make it in the sun. I cut my alfalfa immediately after the sun commences to go down, and I rake it up in windrows. Now when I get that raked up, I go back and move over those windrows, shaking it up with the hay rake. Of course, that allows the light and air to circulate freely underneath. There is a difference between cutting hay and cutting grass to make hay. If it lies on the damp ground it will not wilt, and the point is to have it cure and still retain the goodness that is in the grass. So in curing the alfalfa hay we go over the windrows so that the air will circulate through it and cure it. We do not spread it out where the hot rays of the sun dry it, but roll it and keep it in the shade all we can.

QUESTION. Do you cock it up at night? If you expect a rainstorm coming on, do you cock it up?

Colonel WALKER. No, sir. This year I bought a lot of hay caps. I am going to use those. We cock it up enough to put the caps on, but we do not do that ordinarily.

QUESTION. How long does it take to cure it?

Colonel WALKER. Well, that depends, of course, on the weather. If the weather is dry and crisp, it takes about a day. That is a hard question to answer definitely, because you cannot tell how long it does take to cure hay. If we get good weather and cut the hay today, tomorrow afternoon it will go to the barn. But you understand we have to roll this hay three times before it goes to the barn. The next morning, as soon as the dew is off, we commence to roll it, and to kick it up so that the air circulates through it. If the atmosphere is in such shape that it cures rapidly we can get it in sooner. You know this plant gives off moisture through the leaves. If you leave those leaves to begin to sunburn, it will not give off the moisture in the way that they should to cure it properly, but if you keep it in the shade, why, it gradually passes out, and the curing process is very much better. Then when it is put in the barn it keeps better.

QUESTION. Do you mean that it cures faster in the shade than in the sun?

Colonel WALKER. Yes, sir.

QUESTION. If you use the caps, you can leave it out there several days, can't you, without damage?

Colonel WALKER. Oh yes, but I did not have any until this year. They proved practical and profitable. I should not want to leave my alfalfa out any longer than was necessary to give it a good thorough curing in the dry crisp air.

QUESTION. What size caps do you use?

Colonel WALKER. Why, those that I got this year were heavy domestic caps about forty inches square.

QUESTION. Do you put any of your alfalfa in your silo?

Colonel WALKER. I never put it in my ensilage. I think it is good enough the other way. Corn is not so good. Alfalfa is mighty fine as hay. I never feed any as ensilage at all. I do not think I will under the conditions which seem to exist at the present time. I never put anything in the silo except cow peas, soy beans and corn.

QUESTION. Do you know whether that has ever been tried?

Colonel WALKER. Oh, yes, I believe experiments along that line have been tried in a number of places. I believe it has been tried in Wisconsin. I do not remember the others.

QUESTION. Was it successful?

Colonel WALKER. Unquestionably so.

Now if you are not going to ask me any more questions, I want to talk for just a few moments on why you should grow alfalfa here. First, because it will produce more dry forage than any plant I ever had any connection with. It will produce more digestible protein than any plant I have knowledge of, and that is what you want. Why do you want it? If I was home in Kentucky, I would dwell something on protein. I believe I will consider it for a few minutes anyhow. Do any of you know what part the white of an egg plays in the hatching of a chicken? I have asked a good many men that question, and it is hard to get an answer. Well, the white makes the chicken. It makes the down and the bill, and it makes the red meat. What part does the yolk play? Why, that is the infant food; part of the food which nature has provided for the infant chicken. It is full of nutritious qualities. Now why do you want protein in your feed? You want it to make red meat, and such parts of the body as the head, the hair, the horns, the hoofs and bones. It carries a large percentage of lime. It is a very necessary element in the upbuilding of the body structure. Now the more of that sort of an element you can get in the food which you give to your cattle, or other stock, the better. I do not know how you people feed your hens up here, but in Kentucky we give them all the corn they will eat. Now alfalfa is good for them. When timothy hay is worth twenty dollars a ton, alfalfa is worth eighty dollars a ton, and why? Because of the large percentage of protein which it carries. About three per cent. of protein, about three pounds to the hundred, clover about six and alfalfa about twelve. That is what ordinary wheat bran carries, but we pay twenty-six dollars a ton if we get it, and we cannot afford it. We cannot pay twenty-six dollars a ton for wheat bran to use, even in the dairy industry. The President says that is about what you pay. You get, it is true, a good deal more for your milk, but you get a good deal less for yourselves. That is the fact of the case. We get protein in alfalfa, and we do not have to buy bran. I would not expect that you would expect to get a cow and just feed her a little timothy alone, because she would soon lose on the job. She would dry up. Now with alfalfa it is different. You could keep her along for a longer length of time. Now that gives you an idea in a very crude way of the value of alfalfa as a feed on your farm. Now what will eat alfalfa? Every animal on your place. The hens of the farmhouse will get in among it in the barn. They will get in and scratch among the alfalfa. They like it. You will have hard work to keep them out of it. Those hens get protein from it. It is good for them. That is not all that alfalfa will do. It is good for your horses. It is good for your cattle, good for your hogs, as well as being good for your chickens. You know they even grind it up now and sell alfalfa meal. I expect that some of these fine mornings in Kentucky they will be giving it to us for a breakfast food. Now that is not all. Some of you might say though that we have soil in Kentucky twenty feet deep. Well, we do have some in Kentucky that is that deep, but even though we have twenty-foot soil we do not have among the ordinary crops anything which takes the goodness of the soil to any such depth with the exception of alfalfa. The roots of the alfalfa go down into the bowels of the earth, and take up the goodness of the earth from the lower layers of the soil. We haven't got anything equal to alfalfa to go down and get the plant food that is down there. Alfalfa will. The roots go down deep, and they bring up the potash and other elements, conserve the nitrogen, and deposit it near the surface where it is available. It draws more nitrogen than any other substance, and alfalfa possesses more power to get it out of the earth or out of the atmosphere than any other plant that I know of. I believe that the alfalfa plant is more valuable in gathering nitrogen from the air than any other we grow. I have been raising it for a long time and know that you can get from three to five crops a year. Of what other grass crop can such a statement as that be made?

Some of you may have heard the story about the old Yankee who asked the people in the south why they built their chimneys on the outside of their houses. He noticed that the chimneys were built on the outside of the houses in a great many instances, and so he asked the question, "Why do you build your chimneys on the outside?" The old colonel that he asked the question of turned and looked at him, and he says, "My Yankee friend, I can tell you why we do it — because there is more room outside." So it is with alfalfa. The alfalfa plant has got all the room outside of the earth from which to gather nitrogen, and it is a better gatherer of nitrogen than any other plant we grow. It is not an unusual thing for a good stand of alfalfa to yield three crops of five tons a year, and in one instance I knew of a field that contained seven hundred and fifty pounds more of nitrogen than it did before, and there was an increase in the phosphoric acid and in protein also. It is a wonderful plant. It is wonderful not only as a conserver of chemical elements necessary for plant food, but because of its power to enrich the soil by gathering nitrogen from the atmosphere.

QUESTION. Did you ever plow a piece of alfalfa ground?

Colonel WALKER. Oh yes. When you have a job of that kind on hand your team and the man will both know that they have been plowing.

A MEMBER. I would not have said anything about that because, of course, you do not want to plow it up unless you have to. My experience is that it takes you just about four times as long. It takes just about four times as long to plow a field that has been seeded down to alfalfa as any other crop I ever had. You have got to stop your team every few minutes. You cannot do it with a chilled iron plow. You have got to have a steel plow.

QUESTION. Isn't it dangerous to feed horses on alfalfa hay alone? Isn't it too rich for them?

Colonel WALKER. Well, alfalfa hay is a feed that carries quite a large percentage of protein, but I do not think you can feed too much of it to your horses. I do not think there is much chance of feeding them too much. I think you can feed it to better advantage though. We would rather feed it to a cow. Cows like it and they will pay better under it. We can feed horses shredded fodder.

There is just another point. I do not know how much you people pay for cotton seed meal.

The PRESIDENT. About thirty-one dollars a ton.

Colonel WALKER. Well, suppose it is forty dollars. It carries a very large percentage of protein, and bran carries only twelve per cent. Now which is the cheapest? Why, I would not think about bran if I could buy cotton seed meal, because it carries almost three and one-half times as much protein. If they were nearer the same price, why, I should give bran the preference, but with prices as they are, and with the protein content of the two made up as it is, the cotton seed meal is much the cheapest.

QUESTION. Did you ever sow cotton seed meal as a fertilizer?

Colonel Walker. Yes, sir. It carries quite a large percentage of nitrogen. It is fine.

Question. You wouldn't feed cotton seed mean alone, would you?

Colonel Walker. You can use it in the silo all right. You can feed it in silage, but it is not altogether advisable. When we feed cotton seed meal we do not feed any alfalfa or clover, but we feed it with silage. We do not husk our corn as you do. When we feed it to cattle we grind it up and mix it up with other things.

Question. How does alfalfa do on stony ground? As I understand it, you want pretty fertile land to have the crop do well. Where there are so many stones as there are in some places in Connecticut I should not think it would do very well.

Colonel Walker. I know of no reason why alfalfa will not do well on stony land. If I had some stony land and did not have the other I would try to grow alfalfa on it, and I think I could do it. Stony land is most always upland, and I do not see any reason why it would not do well on some of this Connecticut upland. It will grow on stony land, and it is far better for you to put it there because it keeps your mellow lowland for other crops.

Question. I suppose the alfalfa roots will bore right into the stone and stand up.

Colonel Walker. I do not know about that. I remember I picked off a root this past year that was over five feet long that was boring into a piece of sandstone.

The President. Are there any other questions to ask Colonel Walker? If not, we have a Connecticut gentleman with us tonight, who knows something about raising alfalfa. We claim him in New Haven. He was a graduate of Yale, but he went up to a small town and established a large industrial plant there, which he was fortunate enough to sell out to a trust, and then another trust wanted him, and they finally made him the vice-president of the American Hardware Company. We consider him one of the best business men in the State of Connecticut. He is in the foremost rank, and has been for the past few years experimenting in farm life, and I think if he tells you the truth here tonight, he will say it is the hardest job that he ever undertook. Now Colonel Jarvis of Connecticut is what Colonel

Walker is in Kentucky — he is our alfalfa king, and I take great pleasure in introducing Colonel Jarvis, the alfalfa king of Connecticut.

ALFALFA IN CONNECTICUT.

By Colonel Charles M. Jarvis, Berlin, Connecticut.

Mr. President and Gentlemen: I am a little bit embarrassed by this method of introduction. I was also much amused by Colonel Walker's statement that he had made thirty-two failures in raising alfalfa. I was rather gratified to hear him say that, because I thought that perhaps I had made more failures than any man in America in attempting to grow that wonderful plant. I have been at it for eight years, trying to do something and have failed time and time again when I felt that success was near at hand. I will have to ask your pardon while I confine myself pretty closely during my talk to my notes.

The human family is subject to some strange and oftentimes unexplainable propensities. We here in New England are conservative; sometimes we are called ultra-conservative and because of such conservatism we doubt and discredit many of those things which we know, or ought to know, that we should adopt. Alfalfa is one of these. We have all heard of alfalfa and the stories that we have heard have been so large in all their details that, generally speaking, alfalfa has been discredited almost universally by Connecticut farmers.

A few days ago it was my pleasure to have a short conversation with ex-Senator Harris from Kansas. I found that Senator Harris was a farmer — a breeder of Shorthorns — and in reply to my inquiry as to alfalfa in Kansas he made the remark that beyond any question of doubt the great prosperity which Kansas had enjoyed during the past ten years more or less was due almost entirely to the development of alfalfa, that is, to the large quantity of alfalfa grown by the farmers of Kansas. Why cannot the farmers of Connecticut enjoy that same prosperity? We can, if we only realize our opportunity.

When we talk about getting a crop of eight tons of clover from one acre of land year in and year out it is pretty hard to believe it, and yet it is a fact that in some parts of the country where they practice irrigation they do get eight tons of alfalfa hay from an acre of land, and alfalfa is known in some parts of Minnesota as "Ewiger Klee" or everlasting clover, and was introduced into certain sections of Minnesota as everlasting clover.

All of us who read and travel and observe know that alfalfa is a species of clover; that in some parts of the country it will grow from three crops to six crops per year; that it will grow from four tons to eight tons of cured hay per acre. And yet, we here in Connecticut go along in our same merry old way year after year and do nothing about taking advantage of this information which we do not deny, and most of us know is correct.

The three great objections which I have heard advanced against alfalfa in Connecticut are as follows:

First: You cannot grow alfalfa successfully in Connecticut.

Second: There are other crops which are more profitable for Connecticut farmers than alfalfa.

Third: It takes too much time, too much trouble and too much work, and consequently too much expense to raise alfalfa to make it a popular crop among the farmers of Connecticut.

After an experience of eight years, with probably more failures and more mistakes than are generally allotted to the ordinary farmer, I have no hesitation whatever in denying each one of these assertions, and I believe can prove beyond any question of doubt that exactly the reverse is true. That

First: You can successfully grow alfalfa in Connecticut.

Second: Alfalfa is the most profitable crop a Connecticut farmer can raise.

Third: That alfalfa is the most economical crop in labor and expense that a Connecticut farmer can grow.

The first proposition — You can successfully grow alfalfa in Connecticut. I know this assertion to be true, for I have mowed now for three years from two to three acres of alfalfa, cutting from it three crops each year, the total yield being about five tons of well cured hay per annum per acre, and the field is better this year than it was last year, and it was in better condition last year than it was the year before. Furthermore, I have fifteen acres in addition to the above which was sowed during the fall of 1907, which was cut three times this year with a total yield of about four tons per acre. I have twenty acres more that is going into the winter in good fair shape, so that, extraordinaries excepted, I shall have nearly forty acres of alfalfa on my farm next summer. Every Connecticut farmer knows from practical experience that the past three years have been the most unsatisfactory of any years for a long period on account of the small amount of rain which has fallen during the summer months and all grasses need — yes, they must have — moisture.

I say that I cut from my eighteen acres, more or less, of alfalfa during this summer three crops. The first crop was about three tons to the acre — perhaps a little more than three tons to the acre. The second crop ran about a ton and a half to the acre and on the old alfalfa field the third crop ran about one ton to the acre, but on the new alfalfa field, which was seeded last fall and was cut for the first time this season, the yield was a scant one ton per acre. Understand, please, that these are not measured acres, neither was the hay weighed, but the acreage was approximately measured (not guessed at) and the tonnage I believe was conservatively estimated. Please also understand that when I say a ton of alfalfa I mean a ton of well cured alfalfa hay and not of green grass. The assertion which I make is, therefore, for the past three years I have cut from two to three acres of alfalfa five tons of well cured alfalfa hay per acre per annum, and that during the past summer I have cut from fifteen acres not less than four tons of well cured alfalfa hay per acre, and I want to make the further assertion that neither of these fields had one ounce of fertilizer on any portion of the field, except the original fertilizer which was put on at the time the seed was sown. Understand, please, on my two to three acres I have cut each year on an average five tons per acre of well cured alfalfa hay for the past three years and that no fertilizer of any kind has been put upon any part of this field, except the original fertilizer that was put on the field when the crop was planted. If this is not success, I do not know what is success in growing crops, and I, therefore, have no hesitation in saying that four tons of alfalfa hay per year is easily obtained from an acre of almost any of our cultivatable land here in Connecticut. In other words, that any of our good average soils here in Connecticut will raise alfalfa if we will only have the patience to follow carefully a few rules which are absolutely necessary in order to grow this crop.

Second: Alfalfa is the most profitable crop that a Connecticut farmer can raise. It is generally conceded that the most profitable crop which our farmers produce here in Connecticut is tobacco. I know very little about raising tobacco, as I have had little or no experience and consequently I am compelled to rely upon the judgment and the experience of others. Men who are experts and have raised large fields of tobacco for a number of years tell me that year in and year out, good years and bad years, taking them altogether, with all kinds of weather, all kinds of conditions and all kinds of prices for the finished article, that tobacco will net about fifty dollars per acre. Understand, please, I am talking about net figures, that is, what the farmer has left after paying all expenses of the crop, including the interest on the investment. I believe these to be ultra-conservative figures, as some tobacco raisers tell me that they can net as high as one hundred dollars per acre, but I am inclined to think that taken year in and year out, good years and bad years, successful years and years of failure, taking all the expense, that the net profit on tobacco is somewhere in the neighborhood of fifty dollars to seventy-five dollars per acre.

We have at East Hartford a Mr. Brewer who is famous as the greatest corn grower in America, that is, he has produced the largest crop of shelled corn on a measured acre of land. Last year I think this was in the neighborhood of one hundred and thirty-three bushels, and this year I believe I have seen the statement made that he produced about one hundred and twenty-eight bushels to the acre. This is something very unusual. My experience is that a farmer who can raise one hundred bushels of shelled corn to the acre of land is doing very much better than the average. According to the *United States Crop Reporter,* during the past ten years we have raised in Connecticut an average of thirty-six and six-tenths bushels per acre, although the average for 1908 and 1909 was forty-one bushels per acre. For the whole United States the average during the past ten years has been twenty-five and eight-tenths bushels per acre. As a matter of fact, during the past ten years Connecticut leads all other states in the average production of corn per acre, so that when I assume in making comparison that we can produce one hundred bushels of corn per acre I am assuming a first-class, way-above-average yield. One hundred bushels of corn is worth, generally speaking, fifty cents a bushel or fifty dollars. The stalks are an uncertain quantity, but I believe that when corn stalks are properly cured and properly handled they are worth as much as the grain, or an additional fifty dollars per acre. Of course, if we feed the stalks in the old-fashioned way where the stock eat little or nothing but the leaves, they are worth not to exceed ten dollars or twelve dollars per acre, but I believe with careful planting, careful cultivation and careful care of the crop that our corn crop here in Connecticut can be made worth one hundred dollars per acre. This, you understand, is gross. I think it is the Wisconsin experiment station, at least it is one of the experiment stations in the northwest, that has made a careful estimate as to the cost of producing various crops, and without being able to consult the exact figures, I think they claim that corn can be raised and the crop housed for fifteen dollars per acre. I do not know how it is with you gentlemen, but from my own experience I believe there is very little corn raised in Connecticut but what costs in actual labor twenty-five dollars per acre after the seed and the cost of gathering the crop. The fertilizer is worth at least ten dollars per acre, so that in any event a good, more than average corn crop, here in Connecticut, will net about the same as tobacco, that is, from fifty dollars to seventy-five dollars per acre. My own judgment is that there are very few corn crops raised in Connecticut that net a farmer fifty dollars per acre, but at the same time I think it possible to raise a crop of corn that will net from fifty dollars to seventy-five dollars per acre.

Now, then, what about alfalfa? At the present time it is impossible to buy alfalfa in Connecticut at less than twenty-three dollars to twenty-five dollars per ton delivered on the cars at the nearest railroad station. I have bought alfalfa hay for as low as eighteen dollars per ton delivered on the cars at Berlin, but it was a poor lot of stuff, mostly stems with quite a mixture of timothy and other grasses. It is certainly safe to say that alfalfa hay will average in value in Connecticut twenty dollars per ton housed. A fair estimate for gathering a crop of hay is five dollars per ton — any man who cannot cut his hay and put it into the barn for less than five dollars per ton is a poor farmer. In making this comparison we will, therefore, estimate alfalfa hay as worth twenty dollars per ton in the barn and to cost five dollars per ton for labor, seed, fertilizer, etc., to put it into the barn, or that the alfalfa is worth net fifteen dollars per ton. Five tons of alfalfa per acre is, therefore, worth in the barn fifteen dollars per ton, or seventy-five dollars as the value of the yield of alfalfa hay per acre. Right at this point let me call attention to Bulletin No. 339, issued by the United States Department of Agriculture at Washington, which gives the comparative value in dollars of a few of the common feed stuffs.

"Alfalfa hay per ton $20.16
Clover hay per ton $14.12
Timothy hay per ton $9.80
Wheat bran per ton $22.80
Shelled corn per ton $20.16."

From this you will see that a ton of alfalfa hay is worth nearly fifty per cent. more than a ton of clover hay, more than twice as much as a ton of timothy hay, almost equal to a ton of wheat bran, and exactly equal to a ton of shelled corn.

These figures here would make the value of alfalfa hay higher than I have estimated, but I want to be conservative on these figures because I want the farmers of Connecticut to understand what this alfalfa crop means. Right here, let me say that I do not house my alfalfa, but stack it in the field with a canvas cover, because, to be candid with you, I am afraid to put it in my barns for fear of spontaneous combustion. Insurance people tell me that their statistics show that more icehouses burn than almost any other class of buildings and that their losses from the burning of farm buildings in alfalfa raising districts are greater than in any other farming districts, consequently they assume, and I believe rightly, that alfalfa is a dangerous crop to house on account of spontaneous combustion.

But that is merely incidental. I offer for your consideration tobacco at fifty dollars to seventy-five dollars net per acre, corn at fifty dollars to seventy-five dollars net per acre and alfalfa hay at from sixty dollars to seventy-five dollars per acre. Have I not — I leave it to you — proved my second assertion, that alfalfa is the most profitable crop a Connecticut farmer can raise?

This leads up to the third objection that has been offered, that it takes too much time, too much trouble and too much work to bother with it, to which I reply

Third: It is no more work to grow alfalfa than it is any of our ordinary grasses. Four tons of timothy hay per acre is a large yield — I will venture the statement that there are more fields of timothy hay that grow one ton per acre than there are that grow four tons per acre. My friend Mr. Daniels of Middlefield wrote me last fall that he had some timothy that he thought would run four tons to the acre, and Daniels Brothers are about as successful and reliable farmers as there are in this State. I think the average yield as given by the Department of Agriculture at Washington (I am only quoting my memory and not from the book) — the average yield here in our State is about one ton and a quarter to the acre. You are all familiar with the time and expense and trouble it takes to raise hay — taken year in and year out it is the cheapest crop in labor and material probably that we produce.

Clover — I do not know how it is with the rest of you gentlemen, but I cannot raise clover without first liming my land. I have tried clover several times and have never been able to get any kind of a crop without the use of lime. Clover is a crop that lasts for two years and it is a mighty good crop of clover that will cut five tons to the acre during a season. I think it is safe to assume that two tons to three tons of clover hay on an average year is about as much as a man can expect. Now, then, we know about how much it costs to raise timothy and to raise clover and to raise any of our ordinary grasses, but how do you go at it to raise alfalfa? What is there about this alfalfa propaganda that is so startling in its cost?

In the first place, you cannot raise alfalfa without lime. There are spots in the western part of the State where there is a lime formation underneath, where the land probably will not require liming, but generally speaking Connecticut soil ought to be limed not less than one ton to the acre. My own experience is that the fresh burned, finely ground lime, which one can buy of the Stearns Lime Co. at Danbury, Conn., is the cheapest and best lime to use in growing alfalfa. I have tried several other kinds. The ordinary air-slacked lime is pretty expensive because of the large amount of water that it contains. Many people are adverse to using fresh burned lime for fear it will hill out the humus in the soil. I have tried the various kinds of lime and found no trouble from using fresh burned lime. Ordinary fresh burned lime will increase in bulk from twenty-five per cent. to fifty per cent. in slacking and will absorb pretty nearly that amount of water, so that you can readily see that dollar for dollar, pound for pound, you are getting a good deal more value in the fresh burned lime than you are in the slacked lime. I believe in liming all soils here in Connecticut and I also believe in giving them a full measure, that is, one ton to the acre.

The second absolute necessity in raising alfalfa is to supply the soil with bacteria. I do not attempt to go into the science of the growth of alfalfa, only to say that it is absolutely necessary in order to have a successful field of alfalfa that the soil be inoculated with about five hundred pounds of soil from a growing alfalfa field. There is no use to try to raise alfalfa successfully in Connecticut without inoculating the soil.

Now then, my friends, I have, through the agricultural press, tried to tell you all of the mistakes which I have made in the past few years in trying to raise alfalfa. We learn more from our mistakes than we do from our successes, and I want every farmer in Connecticut to understand that while alfalfa is, to my mind, the best crop he can raise and costs but very little more to start than it does to start a good crop of clover, yet there are a few rules that must be carefully followed.

First: The soil must be limed and the lime should be applied at least thirty days before the seed is sown.

Second: Bacteria must be applied from a field of growing alfalfa at the rate of about five hundred pounds per acre.

Third: Alfalfa should be sown in Connecticut not later than the first of September and as near the first of August as possible, that is, assuming that you are sowing it alone without any nursing crop.

Fourth: If you want to sow alfalfa in the spring, sow it with beardless barley or oats as a nurse crop — cut the beardless barley or the oats as they come to milk for hay and do not let them go to grain.

One word more, and that is in reference to curing alfalfa. We all recollect how our mothers and our grandmothers went out and cut their catnip and boneset and hung it up in the shade of the attic to dry. Why did they do it in this way — because the part of the catnip and boneset that they needed for use was the leaves and they found by hanging it up to dry in the shade that the leaves adhered to the stalks. Use the same common-sense in curing alfalfa. Cut it in the morning as soon as the dew is off. Cock it up in the afternoon before the dew falls and put a cap over it and let it cure in the cock. In this way the leaves will adhere to the stalks and the leaves are the best part of the alfalfa.

There are in round numbers three million acres of land in Connecticut. One million of acres is occupied by our lakes, our rivers, our ponds, our swamps and our cities. One million of acres are almost thrown away in what we call sprout land — we might call it poor pasture land. There are about one million acres of land in Connecticut that are cultivatable and that are under cultivation. Nearly all of the one million acres of sprout land or pasture land will grow alfalfa. Our average crop production here in Connecticut is something about twenty-five million dollars. Turn one million acres of this sprout land that I mention into alfalfa and grow five tons of well cured alfalfa hay to the acre and it means eighty million dollars. Turn half of it into alfalfa and it means forty million dollars — reduce it sixty-six and two-thirds per cent. and it means a crop equal to our present crop yield, a crop equal in dollars and cents to our present crop yield.

Ladies and gentlemen, here is food for thought.

Now then, as far as possible I am ready to answer any questions that I can.

QUESTION. Mr. President, I would like to ask the speaker if he had a small farm and no money and a large family if he would try to grow alfalfa?

Colonel JARVIS. I would if the farm was not too small. I think a crop of alfalfa, even a small crop, will be of great help to a farmer that keeps any stock.

QUESTION. You stated that alfalfa must have water. I should think that would be one thing in its favor in Connecticut. It will go away down in the ground and get all the water it wants, and around here you can usually find water within a short distance of the surface.

Colonel JARVIS. It must have water in order to make it successful. The last three years, you know, have been dry ones, but I have cut five tons to the acre right in these dry years, and I assume that I could have got better crops, and a much larger per cent. of yield if the seasons had been more favorable. At one time I had about seven or eight hundred feet of pipe running out into one of my fields to carry water. There were some leaks in the pipe, and where these leaks were located the alfalfa appeared much more excellent in condition, so that I assumed that if we had had more rain we would have got more alfalfa. I do not know but we ought to be satisfied with five tons to the acre, but I think if we had a little more water than we did in the last couple of years the crop would have been better.

QUESTION. You spoke about a million acres of land in Connecticut being sprout land. It would take some little time to get that land down into condition. It is a little rough in places, and it would take a lot of hard work to get much of it into condition to sow with alfalfa so that it could be mowed. A good deal of it is rocky land that is practically useless for anything except pasture. I do not think you could do very much with a lot of that for any crop.

Colonel JARVIS. Well, I am not talking about rocky land, of course. I am talking about ordinary sprout land that is reasonably free from rocks. There is a good deal of that land that is well located to raise good alfalfa. I saw down on Long Island last Saturday a piece of sprout land where they had cut off the bushes and pulled the stumps, and they had a first-rate good looking piece of alfalfa.

QUESTION. What I wanted to know was what your opinion was as to whether I had better try to break in some of that land and put it in to alfalfa or put it in to corn.

Colonel JARVIS. If your land is suitable for alfalfa, I should advise it. I think it will pay better than corn.

QUESTION. There are very few of our farmers that raise corn that get fifty bushels to the acre. That is a good deal above the average in Connecticut, according to the figures that have been given here.

Colonel JARVIS. In making the comparison between alfalfa, tobacco and corn, my idea was to give the tobacco and the corn the maximum of value, and it would be reasonable, as my own experience tells me in reference to alfalfa. Assume that alfalfa hay is worth fifteen dollars. Alfalfa hay is worth more than that. You cannot buy it and get it into your mow for less than from twenty-eight to thirty dollars. So taking those figures as the basis, you can see about what the land will yield you with a good stand of alfalfa.

QUESTION. You would not sow this with barley and oats, would you?

Colonel JARVIS. I sowed about half quantity last year. I made up my mind that I would sow it a little bit thicker than that. I made up my mind that the next time I would sow a little more. I think our Kentucky friend said that he sowed about twenty pounds of alfalfa seed to the acre. My own experience here is that we need a little more than that.

QUESTION. Do you think that this alfalfa hay would do for our city customers? A great many of the larger wholesale houses, wholesale grocers, etc., have teams and horses. Do you think they would pay for that?

Colonel JARVIS. I have kept horses on alfalfa for six or eight months, and have seen no bad results whatever. I have a team of mules that do not get anything else, and have not for some time, and they work hard all the time. My own opinion is, based on my own experience, that the first growth of alfalfa hay is all right for horses. The second and third growth is not so good.

QUESTION. You do not think they would buy it here in New Haven and pay such prices as you have quoted for it, do you?

Colonel JARVIS. I suppose there is some market for alfalfa hay, but I think that you would make more money by giving it to your cows than you could by selling it.

QUESTION. Colonel Walker said that the land wanted some preparation and fertilizing before the seed was put on. You tell us that it don't require any fertilizer. What has been your experience?

Colonel **JARVIS**. I did not make that assertion that it did not need any fertilizer. I think I said that it did not matter much after you got it once established. We tried that for an experiment. I put on about twenty cords of manure to the acre. Now I had not put any fertilizer on that two to three acres in three years. I do not know whether that is the way to do it or not, but my own idea is that we ought to have put about five cords of good manure on every winter with a manure spreader. I do, however, make this assertion that I have grown five tons of alfalfa hay for three years on land that was only fertilized the first year.

Secretary **FANTON**. Our Vice-President, Mr. Lee, is an exceedingly modest man. In fact, that is characteristic of every member of the Board of Agriculture, but especially so of Mr. Lee, our Vice-President. (Laughter.) I had to play my very best card in order to get him to consent to address this audience tonight. While he never did consent to having his name put on the program, and I had to do my very best to overcome his objection to speaking, then I ventured to put him on after I had reminded him that I would put on two other good men for the same evening. I leave it to you to judge if I did not fulfill my part in putting on two good men for the same evening. It gives me great pleasure to introduce Mr. Lee, our Vice-President, who is to speak to us for a short time.

DAIRYING IN EUROPE V. CONNECTICUT.

BY VICE-PRESIDENT WILSON H. LEE, Orange, Conn.

Gentlemen: I remember in my boyhood days that we used to have up in the Massachusetts town where I spent some of my early days the *Boston Herald*. The reporter for the police court used to write up the daily happenings in a most interesting and entertaining way, and in such an entertaining manner that the men that came up before the judge and were given ten days and costs, when they read the *Herald* the next day, would really think that he had favored them. This reporter was given to drinking himself at times, and one morning he landed in the police court. In the report in the *Herald* the next day he did not spare himself. He started his report in this way: "This morning I find myself among the number." Now when I looked at this program here today and found myself among the number, I felt something like the child that was sent upstairs by the mother, and told that when the father came home he would be sent up to punish him. The boy, hearing the father come, crawled under the bed to get out of the way, and the father coming upstairs and seeing that the child was not there, knew well where he was, and so he got down on his knees and commenced to crawl under the bed. The boy looked at him and he says, "What have you been doing, dad?" (Laughter.)

Now I see my subject here is as to what I have observed in dairying in Europe. I was fortunate enough to make a trip on the other side this summer, and being a lover of Ayrshire cattle I wanted to land in Scotland. I never will regret or forget that beautiful September morning when we arrived at the mouth of the Clyde, and when we started up the river on that boat. The distance up the river gives one a sail of about ten or twelve miles, and at times the scenery is very interesting. The shores of the river are dotted with shipyards and other industries, but by far the greater part of the banks along on both sides were covered or occupied with farms laid out like a checker-board. Fields of alfalfa, fields of wheat, fields of potatoes, all of which gave a variety to the scenery. These fields were all divided with hedgerows, so common to the old country. It was a sight that I wish every one of you could have seen. I never will forget it. It was my first sight of a foreign land.

Over there, as you have heard, they have the Scotch mist. They get that about every day in the year, and this year when I was there they had more rain than usual, and that made the fields unusually green. Now, as I have said, the fields that are occupied as pastures were covered with Ayrshire cattle, of which I, among others, am fond. We arrived in Glasgow, and after a good dinner, it being too late for church, I said to my friend who was with me, and who loves the farm as well as I, "Now let us find out where the good farms are." We asked the hotel man, and he told us to take a car and go down to a park, and he said that in that vicinity we would find some of the best farms in northern Scotland. We did as we were directed, went down to this large park. There was a fence dividing the park from the street, but over on the other side I saw a half dozen very handsome Ayrshire cattle. I asked a man coming along, who looked as though he might be a farmer like myself, if that piece of ground belonged to the public park, and he said, "I do not know, sir, but I know they don't allow you in there." I took my chances. I scaled the fence. I was bound to get close to those cows, and I will say to you, gentlemen, that I have seen a great many of them in this country, I saw a great many of them over there, but I never saw six such cows in my life. After admiring those, we made inquiries as to where there was a farm, and we were told that there were some in the vicinity, but that the people probably would not let us into the buildings. There was a gentleman there from the country that said that he knew the man that lived down the road, and he said, "I see that you are interested in these matters, and I will go along with you." He took us down to a farmer's home, a thrifty Scotchman perhaps thirty-five years old. His front yard looked like all of those places over there. When they get time to cultivate them and make them as beautiful as they do, I do not know, but in nearly all of them there was a beautiful garden with flowers. We went around to the rear of the house, met the man, and he took us into his barn. It was on one end of the house. The barn had cement floors, no windows; all the light and ventilation came from the roof. Not a place I would like to keep cows in. Between the cow stable and the main part of the house was a sort of washroom for their dairy or utensils, or where they did the household washing. Then the kitchen. It had a stone floor. They took us all through the house. It seemed to be very comfortably furnished. The farmer had about fifteen cows, and he kept things very neat. He was supplying milk to Glasgow market. He got about five cents a quart for it. He told us that his farm was not what we wanted to see, but that the one we wanted was down below, and he says, "I will go down there with you and introduce you." So we went down to the next farm. This farmer had about twenty-five to thirty cows, and as I looked over his herd I saw that they were not as good as those in the park. And I said to him, "You have a very good herd, but I saw some fine animals up here by the park." "Oh yes," he said, "those are Lord So-and-So's. He has about two hundred head. Those six cows are selected to show at the fairs throughout the country." So you see that was the reason that I happened to strike those very good cows. Then as we went into the second barn they were milking. His wife and two hired girls did the milking. I went along to the wife, a woman perhaps thirty-five years old, with red cheeks and a good strong physique, a typical Scotch woman, representative of that class. She had on a sort of canvas dress and wore heavy shoes. She was dressed for milking. As I went along to her I said, "Madam, it is not necessary for me to tell you that I come from America, and in that country we make the men do the work that you are doing here." She and those two girls who were with her were doing the milking. The girls were hired for about ten dollars a month, and they were doing the housework, and incidentally helping to perform a portion of the farm work, with one man that he had to help him there. On inquiring, I found that that man held that farm under a lease, such as most of the farms over there are held under. Most of the farms are lease-hold property. He had about one hundred acres, and there was not a piece of it as large as the top of that table that was not under thorough cultivation or in pasture. Every inch of it had to be utilized. He was paying one thousand dollars a year rent for the farm, and his ancestors had paid the same rental before him. There were hedgerows all through it, and he was obliged to maintain a certain standard of fertility on the farm. All of his products were sent to market. He was selling principally milk, which was sold in the Glasgow market at five cents a quart. There it was retailed at from eight to nine cents. He informed me that they were paying what would amount in our money to from ninety to one hundred dollars apiece for the cows that he had in his barn. The same cows could be bought in this country for from fifty-five to sixty dollars. There is one thing in that country that was striking. As you go around you do not see anything but Ayrshire cows. When you get into England it is principally Shorthorns. When you get into Holland it is all Holsteins. They do not mix the breeds there as we do here.

Now our next stop in that country was in Melrose. I thought of the "Lady of the Lake" as I went through there. The mountains are covered with thousands and thousands of sheep, and the members of the Sheep Breeders' Association here this morning, and the ones that are here tonight, would have liked to have seen the sight that I saw. After doing the home of Sir Walter Scott and Melrose Abbey and other places of interest, I said to my friend, "We must not lose any more time, but we must visit some farms;" and so we started out to do so. We were directed where to go to find some of the best farms in the vicinity. We went up to the front door of the house. The front yard was filled with flowers the same as the other, and I rather expected to find the same inviting conditions in the barn as we had seen in those other high-class farms. We rapped at the door, a Scotch lady came out, and we told her who we were and what we wanted. She said, " I will call my brother." She called her brother, and he said that the first thing he would show us would be his barn, because his cattle were out. So he took us out to the barn. Well, I thought I had seen some filth in barns in this country, but I gave it up when I saw that Scotch barn, that Melrose barn. It beat anything that I have ever seen for nastiness, and I got out of it as soon as I could. The odor was too much for me. He then took us into the hills and showed us a herd of about twenty-five Ayrshire cattle. They were beautiful cows. It was a beautiful herd of cattle. A fine field, and the herd was installed in fine grass land. Excellent pasturage. When it came to the care of the milk and cleanliness in his stable he did not know the first principles of it. After admiring the stock, and noticing another good barn and another good set of buildings, we asked whose those were, and we were told that they belonged to Lord So-and-So. It was regarded as one of the best farms in that country. We asked if he would allow us to visit it, and he said yes. Now these barns were what would be called in this country, I suppose, modern. The ventilation was from the top, and when you got inside I will tell you, gentlemen, they were very defective. We were expecting when we saw the exterior of those buildings, together with the fine house, the front yard filled with beautiful flowers, etc., that we would find cleanly conditions there, but again we were disappointed. The conditions were not quite as bad as the other, but still they were conditions that any of you here should be ashamed of. I am going over these matters very briefly because the hour is late.

The next farm I visited was the royal farm at Windsor Castle. I was quite anxious to visit Windsor Castle. I told them that I was going to visit Windsor Castle, and that I was going to visit the cow barns first. I inquired for the stable. I was directed to the stables, but as they understood what I wanted was the horse stable, they sent me to the horse stable, where I found from one hundred and fifty to two hundred horses and ponies kept for the royal family. I had seen the king's stables in London, and had no time to waste on horse stables. So I asked to be directed to the cow stables. " Sir," I was told, " it will do you no good. They will not allow you to see those stables." " Never mind," I said, " will you tell me where I can find them?" "They are down here a mile and a half." I started for the cow stables. I went down there in the broiling sun, and went to the farmer's house and presented my card, and was told that he was not at home. "Is his wife in?" "Yes, the Missis is in," they said, and I told them I would like to see her. Soon the good lady came out and invited me into the front room. I told her who I was and what I wanted to see, and she says, "You wait a moment." She brought me out a note to the herdsman, or head farmer, and allowing me to visit every part of the royal stable. I was not so much disappointed. The barns were beautiful. They cost perhaps one hundred and fifty to two hundred thousand dollars. The cow stables were of brick, and were better constructed and ventilated than the ones I had seen before, although not as well ventilated as we think desirable in this country; still they were very good and were light. They had in that herd about sixty head of beautiful Jersey cows, and some young stock. They have at the royal farms a herd of Shorthorns. Everybody in England has Shorthorns. Those Shorthorns they keep to show at the country fairs, and the Jerseys they keep for dairy purposes; in other words, to supply milk, cream and butter to the royal family. These barns, as I said, were built of brick. The stables were very well ventilated and arranged, the feeding arrangements were good, but not on the whole as well up to date as a stable of that grade would be expected to be arranged in this country. They had a dairy building. I looked at it, and I should say that it cost perhaps one hundred and fifty thousand dollars. It was a beautiful building. They had a large milk room with beautiful frescoes, and there were statues about it, which cost a great deal of money. It was very handsomely decorated. Their method of handling the milk and their way of cooling the house was by the use of running water. They did not use a separator. I did not see a separator while I was abroad. I understand that they do have some, but I did not see any.

The women do the milking almost universally. In the royal stables I do not think they do, but in all the others that I saw the women did the milking. Their method of cooling the milk was not quite the same as ours. They had been told though that it was the proper thing to cool the milk by a cooler, so they had purchased a cooler. Back of the approach to this dairy was a little building with a roof over it, and the cooler was set up and run out there. I asked the lady in charge of the dairy room if she considered that was a good place to keep that cooler out there where it came in contact with all the dust that was flying.

"Oh yes," she said, "we did have it in the dairy room, but we didn't like it there, and it was more convenient to put it out there," and so they had moved it. The butter for the royal family and cream is pan-set cream. At the side of the room there were narrow marble tables, and two marble tables running down through the center, and under these marble tables they have cold water running, a continuous stream, and that is the only cooling that that room gets. The milk is shipped to London every day.

One other milk farm I visited in London. This man had a Shorthorn herd, and he was up to date. He was one of the few in that country that were cooling milk in a modern way. They do not know anything about the cooling of milk by the use of ice. His stable was constructed in the same manner as most of the English and Scotch ones, with no windows, and all the light and air had to come from the center ventilator, like the ones that we saw in Scotland. In discussing the situation, I asked him why he kept Shorthorn cows. "Why," he says, "we buy cows here, milk them out, and let them go to the butcher. True, we do not get as much production of milk but we do not think that we can afford to keep anything but Shorthorn cows for our dairy, for the reason that they bring such a large price from the butcher." And all through England it is the same way. Most of their herds are composed of Shorthorns, but in certain herds they are introducing some Jerseys. All through England most of the farms, as I have said to you was the case in Scotland, do not have a piece as large as the top of that table but what is producing something. Their fences there were of the best. The fences were principally hedgerows. Their fields are as even and as free from stone as any field that you ever saw. If there were ever any stone they have been removed from time to time until they are entirely clear from stone.

In dairying and the care of milk we are ahead of them, but when it comes to crops we are, as the boys say, "not in it." They are raising two to one of what we are on our land. Feed for their cows as well as a great many crops. They raise a great many potatoes and a great many oats. They feed considerable oil cake, but their main reliance, so far as I could see, was hay, potatoes and oats. As I have said, they raise double what we do on a given acre. One farmer does not try to cultivate all England. He only takes a very small portion of land, in fact, he cannot, as the land is very valuable, and he is obliged to get the largest possible production from a given acre in order to make ends meet and pay his rental.

Now I have talked along in a rather desultory way, but just one word further in regard to Holland. It would do you good, you that have not seen Holland, to go through there and see those beautiful fields. The whole country is practically as level as the floor of this hall. Their fences and dykes that run up and down through there are extremely well built and attractive. Throughout you see only Holstein cattle, and many of those. Many of the farmers live and stable their cows in these windmills which you have seen pictures of. All of you have heard about the neatness of the Dutch farmer, and all farmers they claimed to me are neat. They do not want to tell me that any more. I was in Amsterdam one day, and the worst situation that I have ever seen in the dairy line met my sight in Amsterdam. We just visited a diamond factory, and some one hearing that I was interested in seeing a farm said that I might be interested to see a cow stable a few blocks away. I told them that I would, and he took me over there, and took me into a cow stable in the center of the city of Amsterdam. The ceiling was not over seven feet high if it was that. The light was admitted from two small windows. A small stable, and in that small stable were at least thirty great Holstein cows. I do not think any of them had seen any outdoor life for a year. Perhaps some of them had not seen it for five years. It was the filthiest place that I ever saw, unless it was that Scotch stable. The feed for those cattle was what the dairyman purchased from the hucksters that lived in an adjoining street. Refuse fruit, rotten fruit, refuse and rotten vegetables that they could not sell were sold to this dairyman to feed to this herd of thirty cows. I wondered that the people of Amsterdam who purchased the milk coming from such cows tolerated such a condition. Talk about cleanliness in Holland. No one need ever talk to me about Dutch neatness after what I saw. I saw other conditions which were better. I saw some on an island just outside of Holland, where it was all fixed up with flower pots all about there, and all that sort of thing. Fixed up for the tourist season to fool Americans and others that go over there. That is about the size of it. In that particular case the conditions were neat and fairly good, but those conditions do not prevail generally throughout Holland. As I say though, they may be in certain places, as on the island of Marque, where most Americans are taken, it is simply a show place. Of course it is a very interesting place to visit, and it is a place that all ought to go, but it is fixed up for your benefit.

Now, as I have said, I would be very glad to answer any questions, but I have taken more time than I intended, with the lateness of the hour. If there are no questions which you care to ask, I will ask the Secretary to adjourn this meeting until tomorrow morning at 10 o'clock.

Meeting adjourned.

THIRD DAY—MORNING SESSION.

Music.

Convention called to order at 10.20 A. M., Vice-President Lee in the chair.

The PRESIDENT. Before we start this meeting I believe our Secretary has an announcement to make.

Secretary Fanton makes announcement with regard to return railroad certificates and reduction of railroad fares.

A MEMBER. How long are those good for?

Secretary FANTON. I think until tomorrow night.

There was something of the same misunderstanding on the part of the express company. The arrangements were all made for express packages which our exhibitors wished to send here to be received by the express company, and when I arrived here I was to pay all charges. You know how independent some of our companies are. Consequently, on the part of a few of you there was some little delay, and if any of you prepaid your charges on the corn which you sent here for exhibition, if you will notify me of the amount, it will be refunded to you. We intend to carry out that agreement. So in case you did prepay your packages, simply notify me of that fact, and the amount will be refunded to you.

QUESTION. Let me ask about the return of these packages. Do we have to pay the charges for returning them?

Secretary FANTON. There has been no arrangement to return the packages. Possibly there may be some question about the charges being prepaid on account of the value of the package. Whether a package containing the ears of corn sent here for exhibition is of the value of the return express charges, I am unable to say. Of course, if there was very much of it, it could be returned by freight.

A MEMBER. Mr. Chairman, as many of those who have corn here who would like to have it sent to the College, if they would let me know if they do not care to pay the return charges, I would be glad to have the corn packed and shipped right to the Connecticut Agricultural College.

Secretary FANTON. I want to say just another word in regard to the prizes. The awards have all been made, and if any of you gentlemen who are interested will go below in the basement of this hall you will find that the names of the prizes are all on at the present time, and the names of the winners of the prizes will be given here before the close of the session. The corn was not judged as early in the session as we intended to have it, on account of the fact that one of the judges did not arrive as soon as was expected. The idea was to have all the corn judged yesterday morning, and in the afternoon have the judges lecture on the corn, giving a demonstration showing why they gave first prize to this exhibit and second prize to that, giving us a demonstration of the way they judge corn, why they judge the corn thus and so, but we were not able to carry that out according to our original idea when we arranged for this convention.

The PRESIDENT. It is a very interesting subject which we have before us this morning. We have gone to a neighboring state for a speaker. We have gone to one of the best institutions of its kind that we have in this country — Cornell University. I can say this to you, sir, that I have had three or four of your boys at my place, and they all showed that they had had excellent training.

The subject this morning is "Animal Husbandry." I take great pleasure in introducing Professor H. H. Wing, who will talk to you on that subject.

Professor WING. Mr. Chairman and Gentlemen: I think that perhaps I owe the Connecticut State Board of Agriculture an apology for the title of my subject. I would not have you for a moment think that I had the temerity to advertise myself to speak upon the whole field of animal husbandry in the time that is allotted to me. When your Secretary asked me to come here I did not know just what sort of animal I could place before you, and he put the subject down on the program in this broad way as a favor to me, in order to allow me to make up my mind at the last moment just what I could best present to you. So I shall not speak upon animal husbandry as a broad subject, but confine myself to the rather narrow field of having to do with the improvement of a certain class of animals. I am accustomed to telling my students that the man who breeds and rears animals is not worthy of his calling undess he has in mind the improvement of those animals, either in themselves or through their descendants. The domestic animals that we use are so far removed from their wild ancestors that in many cases we cannot even recognize them, and we do not even admit that we have reached the limit of possible improvement in our domestic animals. Our study must always be how to secure a greater degree of improvement that shall make these animals more useful to us. We keep them simply because of their use to us, in the case of farm animals, and not for the pleasure of their society.

Now you will frequently see references made in the agricultural papers and elsewhere to the great skill that has been attained by individuals in the breeding of animals, and the skill with which the breeder has produced a certain notable animal or family of notable animals, but when we come to trace the principles that these men have used, we are often struck with the fact that far too many of our great animals have been, after all, produced by accident, and that their owners did not really know that they were producing a notable animal at the time it was born. While we do know quite a good deal in respect to the facts and principles that underlie the reproduction of domestic animals, our knowledge is at best fragmentary and uncertain. We keep domestic animals for the sake of their product, or for the sake of the products which are useful to man. In all breeds and varieties of domestic animals there are practically only two at the present time where the performance of the animal in respect to product has been used as a basis for selection in future generations to secure still greater improvements. I refer to the dairy cow and the trotting horse. The breeders of these animals are the only ones, perhaps, of all men who, to a slight extent, use the performances of their animals as a criterion for their selection. A hundred years ago such a thing as breeding a trotting horse was unknown. Fifty years ago it was practically unknown. Within the last fifty years without paying much attention to anything else except speed, the trotting horse breeders have not only reduced the time materially within which a mile can be trotted, but they have increased the number of individuals much more rapidly than they have increased the certainty of transmission of the quality of speed from the parent to offspring. The breed has been made in fifty years by paying attention to nothing else but performance, because the American trotting register was founded on performance alone, and continued for many years along that line. The breeders of dairy cattle recognized this fact or this principle about twenty-five years ago, and a society breeding one branch of what we know as the Holstein breed was the first to attempt to record the performances of the animals that had made a certain amount of performance in a separate register for that particular breed. From that small beginning up to the present time we now have all of the dairy breeders recognizing performance as equal to lineage in establishing the value of an animal for breeding purposes. At the first these performance registrations were based upon performance and depended upon the reliability of the owner. The record was based simply upon his statement of what the animal had done. In 1894 the Holstein-Friesian Breeders' Association made a step in advance, and asked for the certification of the record of a private owner, and they asked for this certification through the officials of the various state agricultural colleges, and now the other breeders have followed their lead, and now we find all the leading dairy breeds basing their advanced register record upon an official certification by disinterested parties connected in some way officially with agriculture, usually by teaching or experimentation, and these records are called official records.

Now of what use is the record of performance to the breeder? The mere fact that an animal has produced a certain amount of milk or fat, and is thereby entitled to advanced registration, is of little use unless we can study her performance in connection with the performances of her fellows, and use that as a basis of selection. The advanced register records are of use not as a cataloguing of certain number of animals or glorifying the owners, but to give us information in respect to the general tendency of the breed — as to which way it is going, whether up or down. That information is of use to all breeders of that breed.

If we are going up, how can we use these records, how can we study the records so as to prevent further retrogression? The advanced register records present a fertile field for the student to study general tendencies and principles so as to draw from them facts which may be of use to anyone interested, not only in a particular breed, but in any breed having this particular tendency. So, while the few studies that we have been able to make with a certain breed are of particular interest to the breeder of that breed, they are of equal application to any dairy animal, and so I have narrowed my subject down to a single inquiry in respect to the product of Holstein cattle, as it is indicated by the advanced register records that have been made since the system was first inaugurated by the Holstein-Friesian Breeders' Association in 1894. What do we learn in respect to the production of these cattle that shall help us in the future? Now I do not know whether the Holsteins are as important a branch of the dairy industry in Connecticut as they are in New York. I am inclined to think that perhaps they are not, but in New York we are getting to be a community of milk producers, producing milk for consumption very largely, and we know the general characteristics of the Holstein cattle, and we know that while the milk is not as rich in fat as the best market demands, the improvement of the cattle or of the breed in respect to quality for their milk is a thing that while it may not always be expressed is nevertheless uppermost in the minds of the breeders of those cattle. It is quite a common topic of conversation among breeders that the percentage of fat in the milk of Holstein cattle has been increased in the last fifteen or twenty years; in other words, that they do not give milk as poor in fat as they used to give. So the first thing we turn our attention to is to study what this effect had been when we began, and then study present conditions with the idea of finding out just how much improvement had been made. The result of that investigation is given on this small chart here. I do not know whether many of you will be able to see the figures, but I think I will be able to give them to you in such a way that they will be readily understool. They are not very intricate.

PERCENTAGE OF FAT IN MILK OF HOLSTEIN-FRIESIAN COWS TESTED FOR ADVANCED REGISTRY SINCE THE BEGINNING OF THE ADVANCED REGISTRY SYSTEM.

Year	No.	Mode	Mean
1894-5	35	3.4	3.491
1895-6	60	3.2	3.334
1896-7	57	3.1	3.250
1897-8	68	3.1	3.276
1898-9	200	3.4	3.401
1899-0	256	3.2	3.357
1900-1	329	3.4	3.343
			3.350
1901-2	644	3.3	3.397
1902-3	677	3.3	3.400
1903-4	1014	3.3	3.430
1904-5	1211	3.4	3.405
1905-6	1590	3.4	3.398
1906-7	1786	3.3	3.429
1907-8	2041	3.4	3.470
			3.418
			.068

The first official advanced register records, as you will see, were made in 1894-95. There were only thirty-five records made that year. In the succeeding year a greater number were made. There were a little over two thousand cows which were tested for a period of seven years, and the average per cent. of fat in their milk was taken.

QUESTION. Is that for the whole country, or for the state of New York alone?

Professor WING. That is for the whole country. That applies to the breed as a whole.

As you see, I am not speaking from notes, and I shall not be interrupted disastrously to myself if I am broken in upon at any time. I hope you will be perfectly free to call attention to anything which interests you, or about which you wish information at any time.

Of the thirty-five cows tested in 1894-5 the mean percentage of fat was 3.491. Of the sixty cows tested in 1895-6 it was 3.334.

The average of the first seven years is 3.350. Now we can see that these cows, while they were comparatively small in number, they got up in 1901 so that they represented the breed fairly well, and they represented the breed fairly well because they were scattered all over the country, among breeders here and there.

Now then, going on for the next seven years, when perhaps you might expect a larger number to be tested, we find the result to be in 1901-2, 3.397; 1902-3, 3.400; 1903-4, 3.430; 1904-5, 3.405, and so on through the list, giving the average of the last seven years, 3.418, and showing an increase in the decimal to .068, or a little less than seven-one-hundredths of one per cent. of actual increase of fat on an average of about two thousand cows. Now this does not show, taking the breed as a whole, any improvement at all, and we are forced to admit that the average Holstein cow, taking the country over, does not give milk any richer in fat than she did fifteen years ago. There has been no improvement in the average per cent. of fat in Holstein cows in the last fifteen years.

Now where did this idea come from? As I said a little while ago, most Holstein breeders will tell you that the Holstein milk is richer at present than it was some time ago. What is the basis of that idea? Now there are some factors which have entered into this situation which are worthy of attention in passing. In the first place, is the fact shown by these figures due to the fact that there are more poor cows, or do they show that there is a stationary condition in the breed? We know that the various breeders have been giving more and more attention to the improvement of their cows, that many poor cows have been destroyed, also that large records have constantly been broken until, in some instances, we have cows giving a little more than twenty-eight pounds of fat in a week. We used to think that sixteen pounds was a good record, that twenty pounds was an excellent record, but now the Holstein breeder does not think he has anything very remarkable unless he has a cow that is giving twenty-four pounds, and from that to thirty pounds. Now if there has been this constant improvement in the record of fat, the improvement must have come from the increase in milk, or, perhaps, to a certain slight extent, to other factors. Now how much does the factor of this small percentage of fat mean in the improvement of the total production of fat? We have made a little study along that line, and this study does show right well that the average percentage of fat does not increase except, perhaps, in the larger producer. In cows that have produced the most there has been an increase there, an increased percentage as well as an increase in yield.

CORRELATION BETWEEN YIELD OF MILK AND PERCENTAGE OF FAT IN HOLSTEIN-FRIESIAN COWS TESTED FOR ADVANCED REGISTRY.

	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
250	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..
300	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	4	4
350	..	..	..	..	..	..	..	..	..	1	11	14	30	19	25	20	14
400	..	..	..	..	..	3	4	23	35	41	46	50	54	38	32	36	18
450	..	..	..	..	6	17	21	29	43	47	41	43	38	29	39	26	20
500	..	..	2	6	10	9	18	27	23	41	22	30	25	19	12	10	8
550	1	..	1	1	..	4	7	15	12	22	15	13	19	9	7	10	3
600	..	..	..	..	4	..	2	5	9	6	17	15	5	5	6	3	3
650	..	..	..	..	2	2	1	..	3	5	3	3	3	2	1	2	..
700	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..
	1	0	3	7	22	35	53	102	125	163	156	169	174	122	122	111	70

	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5 5	
250	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
300	6	2	2	..	..	..	..	1	..	1	..	..	..	..	..	..	21
350	10	3	4	2	1	2	..	..	..	1	..	..	1	..	..	1	159
400	9	8	9	6	6	2	3	1	3	..	..	..	..	1	..	..	428
450	15	15	5	2	4	3	2	..	..	1	1	1	..	1	..	1	450
500	7	2	5	3	2	2	..	..	1	..	2	..	..	..	..	..	286
550	4	1	..	1	3	..	2	..	..	..	..	..	..	..	..	..	150
600	..	2	1	..	1	..	..	..	..	..	..	..	..	..	..	..	84
650	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	29
700	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
	51	34	26	15	17	9	7	2	4	3	3	1	1	2	0	2	1612

On this chart, as you will see, we have made what those who are engaged in studying things of this kind call a correlation table, and we have arranged on this table the various individual animals, about sixteen hundred, and some cows tested in the last year or two in respect to the percentage of fat in their milk and the actual amount of milk yield. In the horizontal line we have placed all the cows that give a certain amount; beginning with 225 and running up to 275 we call those 250-pound cows. That is a cow that gives between 225 and 275 pounds. And then those cows running from 275 to 325 pounds are called 300-pound cows. You see they are all arranged horizontally. Now putting the 400-pound and the 550 pounds of milk cows in a week, and totaling it up, you see it gives from three and two-tenths per cent. up to four per cent. You will find in this table that quite a considerable number of the high tested cows had given a large amount of milk; while, as a rule, the more milk a cow has given, the lower the percentage of fat, as you see in this table here. Well, it stretches out quite a little, and shows quite a number of cows that still test quite high, the large record made in that way.

Now there is quite an intricate mathematical process used to express just what is meant by this system of correlation. The system expresses it in terms of percentage. We have figured this out. As a matter of fact, I do not know it very well myself. It shows in respect to this relation between the amount of milk given and the percentage of fat, when the milk with the correlation is two and four-tenths per cent. That is a negative correlation. That is very strong, and it means practically, I suppose, to interpret it roughly, that that increase, or the large record of a cow gives three parts over her yield and one part over her percentage, or, that the yield increases three times as fast as the percentage itself increases. It shows the same indication of a rise in percentage of fat, but not anywhere near as large an increase in rise in percentage as in pounds of milk given. So that while our little table shows actually very little increase of fat on the average, still, taking the cows, the large producers, there is something of a correlation along that line.

Now taking this in another way, and perhaps you will get a clearer idea of just what it meant from this table.

COMPARISON OF PERCENTAGE OF FAT IN MILK OF COWS MAKING RECORDS OF MORE THAN THE SIXTEEN POUNDS OF FAT IN SEVEN DAYS, WITH ALL COWS TESTED THE SAME YEAR.

Year	Over 16 lbs.	All	Per cent.
1895	3.67	3.49	34
1896	3.98	3.33	13
1897	3.46	3.25	13
1898	3.51	3.27	16
1899	3.66	3.40	10
1900	3.57	3.36	9
1901	3.59	3.34	9
1902	3.73	3.40	9
1903	3.58	3.40	12
1904	3.68	3.43	13
1905	3.59	3.40	13
1906	3.61	3.40	14
1907	3.64	3.43	20
1908	3.72	3.47	22
Average,	3.64	3.38	

It often occurs in undertaking a study of this sort that you will find something that you did not start out to find. We arranged on this table the average percentage of fat in the milk of all cows that had produced more than sixteen pounds of fat, and then the average of the percentage of fat in all cows tested. And this shows in each year the percentage of all animals tested that made over sixteen pounds of fat. Now we find in every case here that the cows that produced more than sixteen pounds of fat did have a little richer milk than all the cows of the breed tested that year. I think there is not a single year where the average per cent. of fat in the milk was not greater, and the difference for the whole time from 1895 to 1908 was about a quarter of one per cent. in favor of the cow that produced a large amount. So that our high producing cows are producing somewhat richer milk than the average of the breed, as shown more in detail by the other table, and this perhaps is where the idea has come that the percentage of fat in milk is increasing because, naturally, we are giving more of our attention to the cows that produce a larger amount of product. We will remember a cow that gives twenty-eight pounds a week, while we may not know anything about a cow that only gives fifteen pounds in a week. These large producing cows are producing still richer milk. The value of the fat is so much greater than all the rest of the milk that it is the only thing that we need to take into consideration.

QUESTION. Were not those cows that gave the better percentage fed better?

Professor WING. Oh yes, I assume in all cases. It is fair to assume that the food that they got was better. But the question of the economy of the product does not enter into the thing here at all. It is a question of the effect upon the animal.

Now the records of this sort have been going on long enough to enable us to study the question a little but further. We want to improve the percentage of fat in the milk of the Holstein cow. How are we going to go about it? The only answer to that would be to find which cows are giving us the increase, and then breed from them. We may assume that in the last fifteen years this has been a factor of selection, to some extent. It has not made any impression upon the breed, if we may accept these conclusions here. There has been a considerable number of cows produced that have records whose dams also have had records. What is the relation between the percentage of fat in the milk of the dam and in the milk of the daughter? Bear in mind that these have been selected cows, and in many cases the daughters were raised because of the record of their dams. Now suppose we find a Holstein cow that tests four or five per cent., or, as in one case, five and six-tenths per cent. of fat. Is she a cow that we would choose to breed from in order to get a high percentage of fat in her daughter? To study that question the following table has been prepared.

CORRELATION BETWEEN PERCENTAGE OF FAT IN MILK OF DAMS AND DAUGHTERS

Dams on horizontal lines, daughters in vertical columns.

	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	
2.4	(1)	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	(1)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
2.5	..	..	..	..	..	..	..	..	1	1	..	..	1	..	..	(1)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
2.6	..	1	..	..	1	2	1	2	2	2	..	4	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17
2.7	..	..	..	..	3	..	..	3	2	2	4	3	1	..	3	1	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	24
2.8	1	..	..	1	1	1	4	3	..	6	..	4	4	1	1	2	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	32
2.9	..	..	..	1	2	1	2	8	9	8	10	6	3	2	4	2	2	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	63
3.0	..	..	..	..	2	1	2	11	12	9	6	16	6	2	3	4	..	1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	78
3.1	..	..	1	1	8	6	2	9	12	14	10	14	11	6	7	3	8	4	..	2	1	..	1	..	..	..	..	..	..	..	..	..	..	..	120
3.2	..	..	..	..	1	2	2	11	14	21	11	17	16	13	8	8	8	3	3	1	1	1	..	2	..	1	1	..	..	..	..	1	..	..	146
3.3	..	..	..	1	1	4	3	11	16	11	19	14	15	14	7	9	4	4	2	..	1	..	..	..	..	..	..	..	1	1	..	..	..	..	137
3.4	..	..	..	..	2	2	2	6	15	20	16	17	15	14	11	5	5	3	11	2	1	3	1	..	..	..	..	1	..	..	..	..	..	..	152
3.5	..	..	..	..	..	5	3	12	13	18	17	19	17	17	15	9	6	3	3	3	2	2	..	1	..	..	..	..	..	..	..	..	..	1	166
3.6	..	..	..	..	..	1	3	3	4	4	10	4	12	12	9	6	7	7	3	1	..	2	1	..	..	..	..	..	..	..	..	..	..	..	89
3.7	..	..	..	..	..	1	..	4	5	10	16	9	11	5	11	7	4	5	6	5	1	1	..	1	..	..	..	..	..	..	..	..	..	..	102
3.8	..	..	..	..	..	1	1	2	6	4	8	5	3	4	3	9	7	7	3	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	65
3.9	..	..	..	..	..	1	1	..	2	5	2	9	6	6	5	5	7	2	1	2	..	2	..	..	..	1	..	..	..	..	1	..	..	..	58
4.0	..	..	..	..	1	..	2	1	..	5	6	10	5	11	8	5	3	4	5	2	..	1	..	..	2	..	..	..	..	..	..	1	..	..	72
4.1	..	..	..	..	..	..	1	1	2	1	1	1	3	3	5		1	1	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	24
4.2	..	..	1	..	..	2	..	..	2	3	2	2	2	2	1	1	3	2	1	1	..	1	..	..	1	1	..	..	..	..	..	..	..	..	27
4.3	..	..	..	..	..	1	..	2	..	3	3	3	5	2	4	2	2	3	1	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	33
4.4	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	1	..	1	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	6
4.5	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	4
4.6	..	..	..	..	..	..	..	..	..	1	..	..	2	3	2	1	2	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	13
4.7	..	..	No +	No −	% +	% −	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
4.8	3 % −	..	208	13	94.1	5.9	..	..	..	1	1	1	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
4.9	3.1 −	39 %	601	434	58.1	41.9	..	..	..	..	..	..	1	..	..	1	1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
5.0	4 %	+	27	166	14.	86.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5.1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5.2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5.3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5.4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
Total	1	1	2	4	23	30	30	89	118	150	143	158	141	119	109	83	72	52	48	23	13	16	4	4	3	3	1	2	1	2	1	2	0	1	

You will notice that it has been arranged in the form of a correlation table, although we have not attempted to work out the correlation. This includes 1,449 cows with the advanced register records, whose dams also had advanced register records. So we know the percentage of fat in the milk, both of the dam and of the daughter, and can compare one with the other. And this has been arranged in this way — with the horizontal lines through there, represent numbers in each space, the daughters or dams that tested the amount given at the left of the horizontal line. Of all the cows whose percentage of fat was three and eight-tenths, their daughters tested as follows: one tested two and eight-tenths, another two and nine-tenths, this one tested three and one-tenth, eight tested three and two-tenths, and so on along right straight through. The vertical lines show the daughters. Of the cows that tested three per cent., two of them had dams that tested two and six-tenths and three of them had dams which tested three, three of them that had dams which tested two and eight-tenths, eleven had dams that tested three and three-tenths, etc.

You will notice through this table a zigzag line running down, and you will see that if you carry it out just in above the zigzag line it is divided into corresponding parts. That line, in other words, separates the table into two groups. All below and to the left represents animals that tested lower than their dams, and all that part of the table above and to the right of the zigzag line represents animals which tested either the same or higher than their dams did. Now you will see that, ignoring a few scattered individuals, that the great mass of figures takes an oval shape, and the zigzag line runs through this oval a little to the low side. That is to say, there are rather more individuals above and to the right of the zigzag line than below, indicating, if it indicates anything, that there is a tendency for the daughters to have milk somewhat richer than their dams. As I say, while we have not figured out the exact correlation, we have arranged the result of these figures into a little table which is shown in the lower left-hand corner of the larger table printed above. Those figures represent just what has occurred. Of the 1,449 cows a little more than a thousand fall into the group between three and one-tenth and three and nine-tenths per cent., which is the common percentage of fat in milk of this breed. All that tested below three, or above four may be not exactly abnormal, but beyond the average of the breed. Now taking the cows, the dams that tested below three per cent., and we will find that they had 221 daughters. Of those 221 daughters, 208 tested more than the dams did, and only thirteen tested less. That is to say, if you take a cow that gives an abnormally low percentage in her milk, the chances are ninety-four per cent. that ninety-four of her daughters out of a hundred will test more than she did, the percentage being ninety-four and one-tenth that will test greater, and five and nine-tenths that will test less. Now if you take the cows that represent the mean of the breed, including the great mass, or one thousand out of the 1,400, and we find that out of 1,034 daughters 601 tested more than their dams did, who had a larger percentage of fat, and 434 had less, the percentage being fifty-eight and one-tenth on one side and forty-one and nine-tenth on the other, or those which tested less.

Now of the cows that went above four per cent. Of these there were 193 cows — daughters. Twenty-seven of them tested more than their dams did and 166 tested less, or fourteen per cent. tested better than their mothers and eighty-six per cent. poorer than their mothers. Now this, it seems to me, shows a strong thing in reference to the transmission of qualities from parent to offspring. We say, and most every one commonly accepts the idea, that like produces like. We have accepted that without question ever since we began to give attention to improving methods, but, as a matter of fact, like does not produce like. Like produces likeness of type, but the constant tendency of an individual or in a breed is to bunch them together in the middle. If we select from those that are away up at this point, the tendency of the offspring is in this direction, or toward the middle. On the other hand, if we select from these that are clear over here, the tendency of their offspring is to go in this direction; or, to put it in another way, there is a tendency in the transmission towards a common center as the standard type of the breed.

Now is there a practical lesson that we can draw from this? I think there is one, and that is a small one. You may say that we have gone to a great deal of trouble to make all these figures, but you will easily recognize that these figures were not assembled in anywhere near the time that it has taken me to talk about them. You may say that we have gone to a large amount of trouble and labor to prove a very small thing. Well, let us see. The practical result or lesson that I want to draw from this talk to you this morning would be briefly this: if you want to improve the percentage of fat in the milk of your cows, it is not the cow that is giving the richest milk that is the best one to breed from, but the cow that is giving a milk somewhat above the average, as shown in this group indicated in the last table. Cows that have given three and four-tenths and three and nine-tenths per cent. of fat will have a larger percentage of daughters showing an increase. There is another reason for this. If we confine our selection to cows of that class, we will naturally have a comparatively few to choose from, and the failures being enormous, we shall not make progress in numbers very rapidly. If we select from cows further up the line here, having percentages slightly above the average, we shall have a greater number to choose from, and the percentage of failures will not be so great; whereas if we go still to the far extreme of cows that give a small percentage of fat in the milk, why, we will get an increase in the daughters, but the increase will not be sufficient to improve the mass of the breed. It is only when we get above three and one-half per cent. in this breed that we are making any marked improvement.

I do not know whether I have made myself clear along this line. I do not know whether many of you are interested, but if there is anything further I will be glad to answer any questions, if I can. Like the others that preceded me, I shall not hesitate to say no if you ask questions that I cannot answer.

The PRESIDENT. Now are there any questions to ask Professor Wing?

QUESTION. You have taken in your talk for your type the Holstein cow. Now if you took the Jersey, wouldn't your figures apply just the same?

Professor WING. I think so.

QUESTION. Another thing. None of our men need to feel disappointed if they cannot get up to the point that has been made by some animal that has made an enormous record. There are lots of good cows that you can get along well with. Therefore, as I understand you, Professor, you would not advice every farmer to pay a thousand dollars for one or more great dams with the idea of running the risk of producing great daughters?

Professor WING. Not at all. If you make your selections from cows which are something above the average of the breed, if you will keep just a little above the average, you will make progress definitely, and you will not have to put that amount of money into it.

QUESTION. Do you think it makes a difference what we feed a cow in order to bring her up?

Professor WING. So far as the percentage of butter fat, no, but that, of course, would be complicated by the environment which the cow is surrounded by, all of which things enter into the amount of milk.

QUESTION. You take no account in this estimate of the sire.

Professor WING. No, we have no means of studying the sire. Undoubtedly the sire had an influence in every case, but we may assume that the influence of the sire was just as great in one case as it was in another, but taking so many as 1,449 cows, the number that is shown on the chart, I think we may eliminate the influence of the sire. That is to say, it has been equalized. There has been as many where there has been improvement from the sire as there has been where there has been retrogression.

The PRESIDENT. I would like to ask you, Professor, if you were breeding for good producing cows, whether you would not prefer to breed from a cow with a fairly good record or from one that stood the test of feeding for an advanced registry; in other words, whether you would feel that you could get a better cow out of a fairly good producing cow or from one of these large producing cows which, according to your statement, are not able to transmit those qualities as well as a cow of a lower productive power. You very seldom hear of a very fast horse that has been produced by a very fast mare that has been raced for some years. There are some few but they are very scarce. I would like to know what your views are about that, so as to get it on the record. I think I understand your position, but I would like to get it on the record.

Professor WING. A couple of horsemen fought that out, if I remember correctly, and the final decision was that the making of a record was an advantage in the transmission of speed in the horse, but when you say, as you do, when you press it to the extreme limit, it does not prove anything when it comes to the breed whether they do or do not. Now take these animals represented in the table. Those that represent the normal of the breed, or a little above the line, I should say that we would expect that their development will improve the development of their offspring. To answer your question, perhaps in a little more direct way, I should prefer to breed from animals that had been developed to the full capacity of their power, but that does not necessarily mean animals of the highest productive power.

President LEE. I am glad that point has been brought up. There is a feeling among some of our men that it hurts a cow to feed her too heavy in order to make these advanced registry tests. I am glad that this matter has come up; as to whether it is safe to force a cow or not, my answer has been always that if you give a cow indigestion, and perhaps ruin her health, it was a good deal worse to run that risk than to let her take her course, to feed her naturally, so that she would produce the best that she was able, and always take her feed. In other words, not to force her beyond all reasonable limits, because in doing that you have done harm rather than good. Would you hold to that same opinion?

Professor WING. Yes, I would. I have made this statement a great many times, when this question has come up; that of all the cows that have been injured, not only for breeding or for any other purpose, that every cow that has been injured is represented by ten cows that never had enough to eat. I have never had that position controverted. You are all good feeders in Connecticut, but I think it is perfectly safe to say that there are very few cows indeed that suffer from over-feeding. A great many cows would be better cows if their owners were better men, or if their owners had the nerve to give good feed to a good cow.

QUESTION. Professor, isn't your argument somewhat in conflict with what we have been taught, that the sire was more than half of the herd?

Professor WING. I do not think that that statement has ever been made in that way, meaning by that, that the influence of the sire in any particular case was greater than the influence of the dam. The sire is only more than half of the herd because he is the sire of all of the offspring, and the dam is only the dam of a comparatively small number. In that sense, the influence of the sire is large. Suppose you have a herd of forty cows, and you do not have but one sire. Each particular cow has an influence only upon her own calf, but in any particular sense he is not more than half. He is exactly the half. In any individual case the offspring may more clearly resemble either parent, and if you take a sufficient number of cases, a thousand or two thousand or ten thousand, we recognize that the influence of both parents is equal in the offspring. The larger the number of cases we include the more nearly exactly are they mathematically the same.

QUESTION. Will that also hold true as to pure breds or the grade?

Professor WING. Yes, it will hold true as to everything.

QUESTION. Mr. Lee spoke about a fast trotting horse not having come from a fast trotting mare. It seems to me that one reason for that might be found in the fact that the fast trotting mares were reserved for the track, and were not bred nearly as much as others; that there was danger of injuring them for trotting purposes if they were made to raise colts. I think that accounts for the fact that that class of horses do not have nearly as many colts as perhaps we would expect. I hardly think it has been shown that horses of that class will not produce fast colts, but it rather shows that they have not had the opportunity.

The PRESIDENT. We have been particularly fortunate during this convention, and this discussion, it seems to me, has been of great interest. Now I have another thing to announce which I think will prove of interest to you. The Secretary informs me that Mr. Patten of the Board has the premium list on corn to announce. I would like to ask Mr. Patten to step forward and read those premiums. You all want to know who has won them.

Mr. D. W. PATTEN. Mr. President and Gentlemen: I have taken off these lists hurriedly, and I would say for the convenience of those who take the New Haven papers that these awards will be published in the *Register* and in the *Evening Leader*.

PREMIUMS ON CORN OFFERED BY THE CONNECTICUT STATE BOARD OF AGRICULTURE.

Class A., Div. 1.
- 1st. Jacob Voorhis, Greenwich, Conn.
- 2d. Dennis Fenn, Milford, Conn.
- 3d. A. G. Gulley, Storrs, Conn.

Class A., Div. 2.
- 1st. John B. Hubbard, Guilford, Conn.
- 2d. Walter L. Yale, Meriden, Conn.
- 3d. Elizabeth Anderson, Greenwich, Conn.

Class A., Div. 3.
- 1st. Phelps Montgomery, New Haven, Conn.
- 2d. Oliver D. Mead, Greenwich, Conn.
- 3d.

Class D., Div. 4.
- 1st. Frederick Sturgis, Fairfield, Conn.
- 2d. John B. Hubbard, Guilford, Conn.
- 3d. H. I. Nettleton, Durham, Conn.

Class B., Div. 1.
- 1st. E. E. Burwell, New Haven, Conn.
- 2d. Harrison L. Hamilton, Ellington, Conn.
- 3d. Louis C. Edwards, Ellington, Conn.

Class B., Div. 2.
- 1st. Frederick Sturgis, Fairfield, Conn.
- 2d. William A. Murray, Fairfield, Conn.
- 3d. Frederick Sturgis, Fairfield, Conn.

Class B., Div. 3.
- 1st. No. 1922.
- 2d. W. P. Johnson, Columbia, Conn.
- 3d. Walter E. Price, Warehouse Point, Conn.

Class B., Div. 4.
- 1st. Sullivan Pine, Portchester, N. Y.
- 2d. Silas E. Mead, Greenwich, Conn.
- 3d. J. E. Watson, Marbledale, Conn.

Class C.
- 1st. Dennis Fenn, Milford, Conn.
- 2d. John B. Hubbard, Guilford, Conn.
- 3d. Seaman Mead, Greenwich, Conn.

Class D.
- 1st. Edward G. Haynes, Suffield, Conn.
- 2d. Edward G. Haynes, Suffield, Conn.
- 3d. Charles Schwab, Yalesville, Conn.

Class E.
- 1st. Robert D. Chapman, Westbrook, Conn.
- 2d. John B. Hubbard, Guilford, Conn.
- 3d. Robert D. Chapman, Westbrook, Conn.

Class F.
- John B. Hubbard, Guilford, Conn.

Class G.
- J. E. Watson, Marbledale, Conn.

The PRESIDENT. We have been fortunate during this convention in being able to draw not only upon our own Agricultural College but upon colleges from a neighboring state. For the second time this morning we draw upon my native state of which I am so proud, and we are now to have a speaker from Amherst Agricultural College. His subject is one that I am sure, if you had been over that farm as I have been over it, that they had solved the problem of which he is going to speak very well indeed. When I went over the farm at Amherst I could see those beautiful fields, and I was very much impressed. They had their troubles in their early days, but a good friend of mine who loves farming as we all love it happened to be one of their trustees, and I think the Professor will bear me out in saying that he has been able to accomplish more for that college than any man ever accomplished for it. It gives me great pleasure to introduce to you Professor William D. Hurd of Amherst, Mass., who will address you on the subject of " The Nitrogen Problem in the Dairy."

Professor HURD. Mr. President and Ladies and Gentlemen: If I had read the program of this meeting before I prepared the paper or address which I have in mind to give you, I might have prepared, perhaps, a little different sort of a paper, but I shall not offer an apology for, perhaps, reading some things that might have been changed. Some of the things which I shall, perhaps, say in the course of my talk may have already been touched upon, but it perhaps, does no harm to have some of these things reiterated, so if I do repeat it will be simply because I feel strongly on this subject.

There is no subject of greater importance to a farmer at present, or that will be of more increasing importance in the future, than the problem of securing nitrogen. This question is an especially serious one in its relation to animal feeding. In our fertilizers too, when we stop to ask ourselves where the nitrogen of the future is to come from, we are forced to pause for serious reflection; and I take it that no more important subject could be discussed in all its phases before any New England audience interested in agriculture, than this one.

This whole subject of the nitrogen supply of the future is one far too broad to be treated in the time allotted me for this paper, so I must confine what I have to say to one line particularly, and have chosen the part nitrogen plays in economical dairy management in New England.

Nitrogen is the great stimulating element essential to plant and animal life. It is as necessary to your life and mine, and to the plants and animals about us, as the water we drink or the oxygen we breath. It, with other things, forms protein,— the flesh forming feed, the material required for building up the tissues of the body, and for maintaining these under the wear caused by the vital functions.

In the past hundred years, its existence, the various forms in which it is found, and the part it plays in the organic life of the world, has furnished a problem ever presenting something new to scientists. The end of this study is not yet, although the past twenty years have given perhaps more definite knowledge of this subject than all the years that have gone before. With potash, phosphoric acid, and lime, it ranks among the elements of foremost importance in agriculture. Unlike either of the other three, it is the most elusive, appears in more varied forms, is most easily lost, and at the same time is the most abundant of these four important elements of plant and animal life. Upon the proper handling, conserving and maintaining of this element, nitrogen, depends the future fertility of the soil and the ability of the land to produce food and raiment, to supply all the needs,— yes, even the luxuries of civilized nations.

The last fifty years have witnessed the greatest progress in the advancement of agricultural science. Liebig, Boussigault, Lawes and Gilbert and others, through their application of well known laws of chemistry and physics to this science, have brought agriculture to a stage where it ranks first among the arts, and is second to none of the professions. These men and those now working in laboratories all over this and other countries, have turned men's thoughts to the soil and its possibilities, and have indeed opened up a " New Earth " to inquiring minds. We have been taught new systems of husbandry, new methods and new ideas have been given us. Among these, the part nitrogen plays is not the least. In this new agriculture we have been turning our attention to the proper forms of human food to use, the proper form of fertilizers to buy in an effort to increase our crop production, and the balanced ration as applied to the feeding of our domestic animals. The first two of these are not to be discussed in this paper; but the latter,— the part nitrogen plays in the activities of the dairy farmer,— is the thing to which I especially desire to call your attention at this time.

The hold that the consideration of the nitrogen problem has taken on the world at large caused a prominent writer to say a short time ago that we are " Nitrogen mad." Whether this statement be true is perhaps an open question, but nevertheless it is of paramount importance at the present time.

When I first came to the neighboring state of Maine seven years ago, I made the contention that a more successful, profitable, and economic system of dairy management could be developed in that state, if the farmers, instead of depending so much on high priced concentrated feeds, would raise more roughage and turn this into the finished products of milk, butter, or cheese. Each year's experience has strengthened me in this belief, and it was with much pleasure that I noticed at the state Dairymen's Association in Maine last week, that there was much more interest in the subject of producing feeds on the farm than in past years. It has seemed to me that there were a number of crops, many of them decidedly rich in protein, that could be raised in New England to take place of, in a way, much of the feed brought from the west; and to the end that I might satisfy myself as to what the conditions were under which our good old red clover could be produced, I experimented to quite an extent with this crop in handling the college farm at the University of Maine, with a view to producing all the feed possible for a good sized dairy herd in that state. Minor details of culture may vary with different conditions, but I believe the general principles which I shall outline in this paper will be found to be as true in Connecticut as they were in Maine.

There are perhaps three phases of the nitrogen problem in its relation to the dairy, which might be discussed in a paper of this length.

1. The character and quality of the feeds rich in protein which are shipped into New England in such large quantities.

2. The waste and losses of nitrogen due to the careless management of the manure produced by the dairy herd.

3. The crops rich in nitrogen that can be grown on the New England farm, and the uses the dairyman should make of them.

I do not care to discuss at this time the subject of concentrated feeds in any but the briefest sort of way. A few years ago we heard a great deal more about the balanced ration than we hear today. Agricultural chemists and animal feeders are far more careful in their statements regarding balanced rations than they were ten, or even five years ago. I believe that it is highly desirable to purchase a certain amount of these feeds rich in nitrogen to bring the ration up to an approved standard, but I do not believe that the concentrated feed should be made the basis of the ration. In buying these feeds, do not do this indiscriminately. You must consider that protein is not of equal value pound for pound in these feeds; that the digestibility, hence the feeding value, varies in the different feeds; and that there is usually a fluctuation in the market prices which may make feed which is highly economical to purchase one month, a decidedly unprofitable feed to buy the next month. The successes of the cow testing associations in Maine, Vermont and some of the other states, are revealing startling things on the value of different feeds in dairy production, and if I were to discuss this matter of concentrated feeds at greater length I could but plead for a careful study of the different feeds and more careful and thoughtful business judgment in the purchasing of them.

2. The losses of nitrogen from stable manure.

Nothing perhaps impresses itself on one as he travels over this country so much as the fact that there are very great losses from the manure heap occurring on every farm. It is of course impossible to prevent all loss from this source, but either farmers do not realize the value of manure, or else they are careless in this direction. I know of men in the states where I have lived who allow the drainage from stable manure to run down the barnyard across the road, and we often see the rich dark colored liquid finding its way into the waters of nearby streams and rivers. Inquiry on my part has brought out the fact that these same people usually attempt to replace this nitrogen costing eighteen cents per pound, potash costing four and one-half cents and phosphoric acid costing five cents, the following spring by purchasing commercial fertilizer. It is needless to comment further on this point as a business proposition.

Losses from stable manure occur chiefly in three ways:

1. Loss of the liquid portions through the stable floors.
2. By heating or fermentation.
3. By allowing rains or melting snows to leach and carry the fertilizing elements away after the manure has been removed from the stable. It will be apparent that anything done to lessen losses in either of these directions is so much saved in dollars and cents.

The following table has been prepared to show the value of the manure produced by twenty dairy cows, when fed on the ration stated, for a period of six months:

Estimate of the value of the manure produced by twenty cows, fed on the ration given below for six months.

Kind of Feed Daily ration	Nitrogen lbs.	Potash lbs.	Phosphoric Acid lbs.
30 lbs. Corn silage,	0.108	0.099	0.042
12 “ Clover hay,	0.240	0.264	0.052
1 “ Cottonseed meal,	0.065	0.018	0.027
3 “ Bran,	0.086	0.048	0.084
1 “ Linseed Meal,	0.054	0.011	0.014
1 “ Corn meal,	0.020	0.004	0.007
Amt. of fertilizing elements per day in feed,	0.573	0.444	0.226
About 75% of fertilizing elements in feed are left in manure,	75%	75%	75%
	0.429	0.333	0.168
Multiply by twenty cows,	20	20	20
Pounds produced by twenty cows in one day,	8.58	6.66	3.36
Multiply by 180 days (six months),	180	180	180
	1544.0	1198.0	604.0

1544 lbs. Nitrogen at 18c. per lb.,	$277.92
1198 “ Potash at 4½c. per lb.,	53.91
604 “ Phosphoric acid at 5c. per lb.,	30.21
Value of manure of above twenty cows for six months,	$362.04

Too much emphasis cannot be laid on saving the liquid portions of the excrement. This liquid portion contains about eighty per cent. of all the nitrogen, and about sixty-six and two-thirds per cent. of all the potash contained in the manure. Further than this these elements are already in a soluble form, and are the more readily lost. If this escapes through leaky stable floors, or by improper storing, very little is left beside the strawy matter and some phosphoric acid. It, then, is clear that a tight stable floor is the first requisite to prevent this waste; and secondly, some absorbant, it matters not what, should be kept on this floor to at once take up the liquid portion before it is lost. Straw is of course best, since it aids materially in improving the physical condition when applied to the land, and at the same time has had some fertilizing value; but in the absence of straw use leaves, sawdust or shavings, rather than lose the most valuable portion of the excrement. While sawdust probably has no actual benefit on the land, it at the same time, in the quantities generally used, does no particular harm, and should be used every time in preference to nothing as an absorbant. These latter two are most popular where the attempt is being made to produce certified milk.

A few years ago the matter of chemical absorbants received much attention. We are not hearing so much about them at the present time, but experiments have shown that Gypsum (land plaster), (never ordinary lime), Kainit, or other potash fertilizers and acid phosphate, all help keep the stable sweet, and when sprinkled in the stable each day, or over the manure pile, help to prevent fermentation and of course add that much to the value of the manure, provided it is properly cared for in the pile.

The matter of how the manure is stored after removal from the stable is important in the prevention of losses. A manure cellar is expensive to build, and try as hard as we will there are odors always finding their way into the stable. With the attention that is now being paid to clean milk, the manure cellar must go. The cheapest and most approved plan now is to have a cheap shed attached, or detached, to the stable, into which the manure is wheeled or carted and stored. The more flat and compact the pile is kept, the less fermentation there will be. When the odor of ammonia is noticeable, you may know that there is considerable nitrogen worth eighteen cents a pound passing off into space. In constructing the bottom of the shed, scoop it out so that it is slightly concave, and be sure that no drainage from the pile runs off down the hillside. It often becomes necessary to remove a part of the manure from the cellar or shed during the winter, to make room for more that is being produced. In making the compost heap in the field, observe the same precautions. Do not build the pile on a hillside, but rather where the ground slopes towards the center, and make the pile compact and keep it flat on the top.

The best method of applying in the field is a matter which usually causes considerable discussion. The three common ways are to draw daily from the stable and spread on the land; to pile in small heaps and let these remain for some length of time; and to draw spring and fall from the pile and apply to land plowed or to be plowed in the future. Deep snows in some parts of New England, and steep hillsides, make the first method often inadvisable. The small pile method should never be used. This small pile of two or three bushels offers the best opportunity imaginable for leaching, heating and fermentation. We have, then, the third way left as the only alternative. Whenever possible it is advisable to get the manure into the soil either by plowing or harrowing as soon as possible. The soil has certain powers of fixing nitrogen to a slight degree, and potash and phosphoric acid to a greater extent, hence loss is prevented. The practice of allowing a covering of valuable stable manure to remain on sod land especially during variations in temperature, and when the ground beneath is frozen, is a questionable practice, and should be avoided whenever possible. Besides the loss of plant food, the strawy matter valuable later to form humus, is often blown away and lost. A manure spreader is one of the greatest time and money savers on the farm, to say nothing of its ability to spread the manure more evenly and break it up finer. An experiment tried a couple of years ago on the college farm showed that a man and team could haul out and spread one-third more manure with a manure spreader than with a cart in a day's time.

3. The crops that can be raised in New England to supply nitrogen.

This subject should rightly be discussed from two standpoints: namely, the fact that the growing of crops which have the power, through certain bacteria, of extracting nitrogen from the atmosphere, are of inestimable value in building up soils which have been depleted of their fertility; and secondly, from the standpoint of substituting home produced protein in place of that in feeds that must be purchased.

You in Connecticut are buying hundreds of pounds of feeds rich in protein,— a term used by chemists to cover all albuminous materials;— nitrogen included (six and one-fourth parts of the protein is nitrogen) in cattle feeds; and large amounts of nitrogen in commercial fertilizers; and at the same time you are allowing hundreds of pounds of the material to be lost each year and are not taking advantage of the inexhaustible supply of this most costly element — nitrogen — which comprises about seventy-five per cent. of the atmosphere. Nitrogen is costing, when bought in the market, eighteen cents per pound, phosphoric acid only about five cents, potash about four and one-half cents and lime about four-tenths of a cent per pound. Nitrogen being the most easily lost of these elements, should receive the more careful consideration.

Dairy farming comes nearest being the safest kind of husbandry, because in live stock production we should aim to raise a large amount of feed, and use this through our animals for the production of finished products, returning a large amount of fertility back to the land in the shape of manure. There are those who will tell you that the absence of live stock is one of the fundamental causes which has led up to the "run down" condition of much land in New England.

The Minnesota Experiment Station has worked out the losses in fertilizing elements in different systems of farming. On a farm of one hundred and sixty acres there might be sold in a year, when different systems are practiced, the following amounts of nitrogen, potash and phosphoric acid:

System of Farming	Nitrogen lbs.	Potash lbs.	Phosphoric Acid lbs.
All grain,	5,600	4,020	2,460
Mixed grain and general,	2,594	1,047	1,003
Potato and general,	2,363	2,435	991
Stock raising,	898	59	35
Dairy farming,	809	85	76

These figures show clearly that dairy and stock farming carry less away from the farm than the other systems. If, in the case of dairy farming, only butter is sold and the skim milk is kept on the farm and fed to young stock, there is only a very small amount of fertility lost, and this is made up many times in the feeds that are usually purchased and the manure that is returned to the land.

While it is well that we understand these facts, it is not enough that we should be satisfied with a fair condition of things; but should, when we know certain losses are occurring, strive to correct them.

While we are discussing nitrogen principally, yet corn should never be left out of any discussion of dairy feeding. More feed can be secured from an acre of corn than any other crop. Silage and the silo are almost indispensable to successful feeding. Most of you will no doubt agree that complaints against corn in this form can usually be traced back to improperly cut, improperly stored, or improperly fed silage. When corn could be laid down at the railroad stations of New England at from twenty-nine to thirty cents a bushel, there might have been some excuse, for you even in Connecticut which has proven itself to be the greatest corn state in this country (yield per acre considered), for not growing corn. But with the price ranging from seventy cents to ninety cents, as it has during the past ten years, there is every reason why corn growing should be taken up with renewed vigor; and I am extremely glad to see so much attention being paid to "better corn for New England" at this meeting.

Among the list of leguminous crops which can be grown profitably in this State for dairy feeding, are the different clovers, peas, vetches, soy beans, cow peas, and we hope in the near future alfalfa.

The following table shows the average analysis of our common farm crops. It offers a chance to compare them from their dairy feeding value standpoint.

FEEDING VALUE OF COMMON FARM CROPS.

		DIGESTIBLE NUTRIENTS IN 100 LBS.		
Name of Feed	Dry matter in 100 lbs.	Protein Per cent.	Carbo-hydrates Per cent.	Crude Fat Per cent.
Corn (silage),	20.9	0.9	11.3	0.7
Corn Fodder (dry),	57.8	2.5	34.6	1.2
Red Clover (hay),	84.7	6.8	35.8	1.7
Alfalfa (hay),	91.6	11.0	39.6	1.2
Barley (hay),	85.2	6.2	46.6	1.5
Cow Pea (hay),	89.3	10.8	38.6	1.1
Millet (hay),	92.3	4.5	51.7	1.3
Oat (hay),	91.1	4.3	46.4	1.5
Oat and Pea (hay),	85.4	9.2	36.8	1.2
Mixed Grasses and Clovers,	85.3	4.8	39.6	1.6
Timothy,	86.8	2.8	43.4	1.4
Vetch,	88.7	12.9	47.5	1.4
Mangels,	9.1	1.1	5.4	0.1
Rutabagas,	11.4	1.0	8.1	0.2
GRAINS —				
Corn,	89.1	7.9	66.7	4.3
Barley,	89.1	8.7	65.6	1.6
Oats,	89.0	9.2	47.3	4.2
Peas,	89.5	16.8	51.8	0.7
Rye,	88.4	9.9	67.6	1.1

The difference in the analyses of clover and timothy hay, the richer manure obtained from the feeding of clover, and the difference in price of the two kinds of hay would go to show that it would be a very profitable venture for a dairy farmer to sell his timothy hay at eighteen to twenty dollars, or even a higher price than this, and buy back at ten or twelve dollars a ton good clover hay.

It seems to me that this side of the question,— the growing of leguminous crops on the farm is the most important phase of the whole matter.

The failures that have been recorded in attempts to grow clover are due largely to a poor understanding of what the conditions for its growth should be, and attempts have been made to produce it under conditions entirely unsuited to its growth. We have passed through that wave of excitement when we were told that soil inoculation was the one salvation for run down lands. We are now ready to say, that given the proper conditions so that the clover plant can thrive, the bacteria will increase in a like proportion. In answer to the statement so often heard that one cannot produce feed so cheaply as it can be purchased, I submit the following statement of expenses of growing an acre of clover through three years under our existing conditions at Orono, Maine, under the method while I had charge of the college farm. I realize that the cost of operations under different conditions very, so I have tried to make this up for an average season, and I think I have estimated the different operations liberally. The soil of the college farm is a cold, wet clay, and one which would not be considered as at all suited to the growth of this plant.

The table, you will notice, covers a period of three years from the time the clover seed is sown until the hay crops of two succeeding years have been removed. The field has been debited and credited with the items which properly belong to it. Time of man and team has been calculated at thirty-five cents per hour, and of men alone fifteen cents per hour. I think you will see that the figures show a sum decidedly in favor of growing clover if only the financial side was considered. What, then, are the conditions most favorable to the growth of this crop.

First, a well drained soil. Naturally clover roots penetrate to a depth of several feet, and when standing water is encountered by them, they stop, " dam off," and go no further. A good deal of the value in growing clover comes from the fact that the roots do go down deeply in the soil, and again bring up plant food which has passed beyond the reach of shallow rooted crops. In a poorly drained soil the clover will grow for a time but it usually kills out before the second season,— the year when the largest crop should be expected. The water table should be at least three and one-half feet befow the surface, and when it is not, tile drains should be put in before clover introduction is attempted.

COST OF GROWING CLOVER HAY FOR THREE YEARS

Per Acre

1st year	
Plowing and fitting land,	$ 4.00
Cost of clover and grass seed, and labor of seeding,	3.25
Cost of 2½ bu. seed oats @ 75¢,	1.88
Cost of seeding down fertilizer 350 lb. and labor,	5.60
Harvesting and threshing 50 bu. oats,	4.25
2d year	
Cost of chemical top dressing 2d spring,	5.95
Cost of cutting and handling 3 tons hay, 1st crop @ $2,	6.00
Cost of chemical top dressing for 2d crop,	5.95
Cost of handling 2 tons, 2d crop, @ $2,	4.00
3d year	
Cost of chemical top dressing 3d season, 1st crop,	5.95
Cost of cutting and handling 3⅓ tons hay, 3d season,	6.66
Rent of land (valued at $50 per acre allowing 5% for 3 years),	9.50
	$62.99

RETURNS FROM CLOVER HAY FIELD FOR THREE YEARS

Per Acre

1st year	
50 bu. oats @ 50¢,	$25.00
2400 lbs. straw @ $8,	9.60
2d year	
3 tons hay, 1st crop @ $12,	36.00
2 tons hay, 2d crop @ $12,	24.00
3d year	
3⅓ tons hay at $12,	40.00
(No 2d crop that season.)	
	$134.60
It should be noted that the above amounts of hay fed to stock would give manure having a fertilizing value of about $58.00.	
Besides this in clover growing the fertilizing value of the top and roots would amount to $20.00.	
All these things should be taken into consideration in practical husbandry.	
If the latter two items were entered, $58, $20,	78.00
	$212.60

Secondly: Some crops will grow fairly well in a soil quite depleted of its available plant food, but clover demands a soil in a fairly good state of fertility before good crops can be expected. It is sometimes necessary to grow and turn under, rye, buckwheat, or some other crop in order to improve the land before clover can be grown.

Thirdly: Clover is a lime loving plant and does not grow and thrive for any length of time in an "acid" or "sour" soil. When this condition exists an application of lime in amounts of fifteen hundred pounds to two thousand pounds to the acre should be applied. Soils, even though they do not show the acidity test by the usual methods, are often greatly benefited by the application of eight hundred pounds or one thousand pounds of lime at the time of plowing the land, when it is the intention to grow clover upon it.

This matter of "water logged" soil and an "acid" soil are directly concerned with the helpful action of the nitrifying bacteria. If we are to get the benefit of having these organisms take from the air and store in the soil and in the roots of this crop, nitrogen amounting to several hundred pounds to the acre, we must correct both of these conditions, for the process of nitrification will not go freely on, and the bacteria will not multiply to any great extent when either condition is present.

Fourth: We should look carefully to the kind and quality of the clover seeds we buy. When a sample of seed will show a germination test of only seventy-five per cent, it means that one quarter more seed must be used. In our climate, where occassionally the conditions are such that clover winter kills, it is advisable to use a mixture of clover and grasses. One that gave us the best of satisfaction, was:

Per acre	11 lbs.	Timothy,
	6 "	Red clover,
	4 "	Alsike clover,
	4 "	Kentucky bluegrass or red top.

The wisdom of using this mixture was shown two years ago when our clover killed out. The next season the timothy and bluegrass came on and gave us a yield of three and one-third tons of hay to the acre.

Fifth: The fertilizer for clover. Clover has the power and we expect it to skirmish around for a part of its nitrogen, hence fertilizers used on clover sod should not contain high percentages of this element. Clover demands potash in liberal amounts, therefore the advisability of using this element quite freely. For several years we used each spring the following top dressing of chemicals on our clover sod and other grass lands.

240 lbs.	Nitrate of soda,	Applied from three to four acres.
360 "	Muriate potash,	
600 "	Acid phosphate.	

Later experiments showed that sulphate of potash was a better source of this element than muriate.

Director Brooks of the Massachusetts Experiment Station strongly advises the using of the mineral elements in great abundance, in order not to lessen the chances of the clover crop taking large amounts of nitrogen from the air.

These materials are mixed together and applied broadcast at the rate of three hundred pounds to the acre, early in the spring. They are all soluble and are quick in their action.

For the reasons spoken of in the earlier part of this paper, I do not advise the use of stable manure as a top dressing on grass and clover sod.

Sixth: The time of cutting and method of curing clover determines the nitrogen content in the hay, and also the duration of the clover plant in the land. Cut in full bloom as compared with that cut out at a later stage, the differences of composition are as follows:

1. The crop contains less woody fiber when in full bloom.
2. The crop contains its maximum amount of protein when in full bloom.
3. The nutrients in the crop are more evenly distributed.
4. The crop contains its maximum amount of essential oils which impart palatability to the feed.
5. The hay is of a brighter color, more succulent, and is relished better by stock than hay cut at a later period.

Plants when they have produced seed, die, their cycle of life has been completed. When cut in the bloom and before any seeds are produced, the roots will produce another set of stems and leaf, hence more than one crop is secured and the life of the plant in the soil is lengthened out.

Seventh: There is still another thing in clover production which must not be overlooked, and that is good tillage, proper preparation of the land, and an occasional rotation of crops. If bacteria are to take nitrogen from the air, we must devise means of promoting soil ventilation. The plow and harrow are the chief means at our disposal of aiding in this matter, and we should make good use of them.

I am sorry that I was not present last night to hear what the two gentlemen said about alfalfa growing for Connecticut.

Every one, I am sure, is desirious of seeing alfalfa being grown successfully in New England. As shown by the table giving the analysis of the different farm crops, it is considerably richer in protein than clover; and if it could be grown it would be the "salvation of the dairyman." Alfalfa is a perennial, that is, lives for several years when once seeded. A field should be at its best when five or six years old, and should continue to produce good crops for at least ten or fifteen years. The most of the alfalfa fields in New England which I have seen, gradually lose their producing power, and have a tendency to die out after the second year. Until we can overcome this tendency, we cannot really say that we are growing this crop successfully.

In alfalfa growing, all of the conditions I have mentioned as being essential to clover growing, must be present. And some of them must be even more carefully looked after. Good alfalfa land must be well drained. It does not make much difference what the top soil is, but the sub-soil must be porous. Alfalfa land must be free from weeds at seeding time. This crop cannot fight for a start with weeds. The seed must be virile. Much poor alfalfa seed has been offered in eastern markets. The alfalfa when once started must be cut whenever any of it begins to bloom, whether the yield be five hundred pounds or five thousand pounds to the acre, if the strength of the field is to be maintained.

Perhaps a great advance could be made if some individual or experiment station would start seeds from some of the alfalfa plants which are growing wild in nearly every region, and by a series of careful selection, develop a strain adapted to New England conditions. Many of the best agriculturists of the east have given alfalfa the best possible conditions, but there seems to be some local conditions under which this crop does not succeed.

It does not seem to me that alfalfa for New England has yet passed the experimental stage, and so is not to be considered by the average farmer very seriously. Until some work is done toward making this most valuable crop more hardy, the mass of the farmers had better stick to the good old reliable red clover.

By referring again to the table, the high protein contents of oat and pea fodder is called to your attention. Surely this should find a more prominent place in the feeding ration of the future than it has in the past.

I have but briefly touched on these essential points in clover production, and have made no effort to explain them very minutely. The observing of these simple directions properly applied to your own farm conditions, will enable you to grow abundantly the greatest all around crop known to the world today.

As time goes on, and as we become more familiar with the forces of nature surrounding us, the coming dairyman, I believe, will be known as the "Legume Farmer," producing what he uses and taking advantage of things which a knowledge of modern agricultural science places at his disposal. By observing simple directions for caring for the stable manure, by the exercise of good business judgment in the purchase of concentrated feeding stuffs, and by the production and trapping of nitrogen in the clover plant, dairy farming will hold its place as the safest form of husbandry, will build up these so-called "worn out" farm of New England, and will stop an everlasting, useless, and unceasing drain on what might be the most profitable line of agriculture in this State.

The PRESIDENT. Now, are there any questions to be asked of Professor Hurd? Professor, some of those figures that you gave I do not quite understand. What is your corn fodder value?

Professor HURD. As you see here, it is about two and one-half.

QUESTION. You mean as compared with timothy?

Professor HURD. Well, yes. Almost the same as timothy in protein.

QUESTION. Did you ever find any difference in your analysis of corn planted after the twenty-fifth of June and that planted before?

Professor HURD. Oh yes. There is a distinct difference in the different stages of the growth of the plant. I do not know that I have even come across that, but there is a difference in the different stages of the growth.

QUESTION. Cattle will eat all of the corn plant where it is planted late, but some of it planted earlier they will not eat, except the leaves and the husks.

Professor HURD. There is a difference, of course, in the palatability of it. The early corn, of course, matures and after a certain time loses in succulency as a food.

QUESTION. You spoke of vetch. Can vetch be grown successfully in this climate?

Professor HURD. Yes, sir. I should say that it can be, at least in northern New England. We were very successful in growing winter vetch, both for a cover crop and for other purposes.

QUESTION. What time do you sow it?

Professor HURD. We usually sow it along about the first of August. Of course, you can get it in some later than that. I think it should be sown in this latitude from the first to the tenth of June to get the best results.

QUESTION. How much seed do you put on?

Professor HURD. We sow, I think, about a bushel and a half to the acre.

QUESTION. What does your seed cost you?

Professor HURD. I have forgotten.

QUESTION. I think the seed cost about a dollar and a half. It seems to me that the sowing of winter vetch is a good proposition. I would like to ask the Professor if he knows any better proposition for a cover crop?

Professor HURD. I think red clover is the best proposition we have, for I think, from our experience, there is no place where you can grow red clover any better than right here.

A MEMBER. I had a little experience with trying to raise vetch. I sowed a piece of ground to standard vetch, it was a good piece of ground, very early, and the vetch came up, but it did not half cover it until the next spring. I took that same piece and sowed it to red clover and got three tons to the acre the next year.

A MEMBER. I have been looking at the figures on this chart. What do I find, Professor, on this chart here to encourage me to go home and build one?

Professor HURD. If you want me to answer that question I will say that I believe that you can get more milk out of silage and some root crop to help you along through these dry years. You get a very large amount of yield and it gives you a very large amount of feed on which to base a good deal of your ration. I have no hesitation in saying that I should think it would pay you to go home and build a silo.

A MEMBER. I do not see very much to encourage me.

Professor HURD. Why?

A MEMBER. Because I take this corn fodder and use it in this way. I take care of my stover. I try to take excellent care of it to make it bright and good. Then I cut it with a cutter, and throw on some hot water, and I get pretty good results in that way. Now I do not see how I am going to get any better results from your method.

Professor HURD. Well, my friend, I think you will get a better feed by taking your succulent green feed and using that — by using this green feed as a substitute for the summer green feed that you have.

A MEMBER. That is almost the same thing.

QUESTION. How would you rate the value of mangels?

Professor HURD. Mangels have a good feeding value. Of course, they are low in some of the elements of nutrition. But any form of roots of that kind is useful as food at the proper time and in the proper proportions.

The PRESIDENT. Gentlemen, one moment. I am going to call this meeting promptly to order at two o'clock, and there will be time then to ask Professor Hurd any further questions.

We are honored here today by the presence of one of the best informed, all-round men in the State of Connecticut. He is just as well informed on agriculture as he is on a great many other subjects. I refer to Professor Brewer. I want to ask you to listen to him for just about five minutes. When I was asked if I believed that Cook reached the pole I told them I hadn't any opinion, but I believed he did because Professor Brewer knows him and he says so. (Applause.)

Professor WILLIAM H. BREWER. Mr. President, I used to talk quite often before this Board, but I am out of it now from age and lack of hearing and so on. I practically have nothing to say. When I see a lot of men get together now and discuss the subjects which you have just heard in the way that it was discussed, I cannot help but feel how thankful the farmers should be that they live in this age and do not have to fight out the old battles which I had to when I first began to teach agriculture. At that time there were a great many things which could not be learned from books, and about which science could not help us, because the period of investigation was in its infancy, and we had no such store of knowledge regarding these matters as we have now. I know all of you do not recollect, and perhaps cannot appreciate as fully as I do how fully the whole matter of agriculture has been revolutionized in less than one lifetime. Agriculture, when I was a boy, was thought to depend very largely on a matter of tillage. A great many of these most important and interesting things which have been brought out in recent years were unknown. When I was a boy that began to be changed. Manure was put on as the basis of it. Very little was known as to how manures should be applied. I came here to go to the Scientific School to learn how to analyze soils, and how to raise the best crops. That movement was started here at Yale — the movement to analyze soils, to see what it needed put into it to enable it to raise the best crops. I came here for that purpose. That is all changed now. Not that we find that the analysis of soils is useless, but we find it absolutely useless in that way for that purpose. How many years we had to labor to get the first experiment station started, and how wonderfully that movement has grown. The first experiment station in America was established in this State, and this Board, what a sight it did in aid of that movement. In that respect it did more than any other board in the United States for the establishment and upbuilding of scientific agricultural experiment stations. There is plenty of room for work now, but it lies on other lines, and on other grounds. The conditions are so different than when I began to talk to my classes on agriculture here — what I told them was a profitable way to work would ruin any farmer now. All conditions have changed. I wish I had time to go into some of those things in detail. I think it would interest you, but I shall not take up any more time. Let me just call this one fact to your attention. I did not come here until in the '60s, and I began to talk to my students along this line: you have got to have something that you can sell; you cannot compete with the west in growing corn or wheat. They can grow it very cheaply, because they have cheap land there, and therefore you should take potatoes and such things, things for which you have a market right close by. Well, I used to tell them that they could not bring potatoes from the far west. In a very few years from that time I bought in the market for my family some potatoes which I took the pains to see where they came from. I got potatoes from Minnesota and from Ireland and Norway, aside from those which were home-grown. Brought right into this market and sold in New Haven.

I thank you very much for this brief opportunity to talk to you.

The PRESIDENT. The meeting will stand adjourned until this afternoon at two o'clock.

THIRD DAY—AFTERNOON SESSION.

Music.

Convention called to order at 2.20 P. M., Vice-President Lee in the chair.

The PRESIDENT. I announced this morning that this meeting would be called promptly at two o'clock. When I took out my watch I found that I am something of a liar myself. We heard two very interesting addresses this morning. We have some men on our College staff at Storrs who know a thing or two about the cow, as many of you know who have heard them speak. Now we are to have this afternoon Professor J. M. Trueman of the Connecticut Agricultural College, who will talk to us on "The Best Method of Improving the Dairy Cow."

Professor TRUEMAN. Mr. Chairman and Gentlemen: I do not know but it is a good thing to come back home to wind up this meeting. I suppose I am to give you the first talk this afternoon as the beginning of a sort of a wind-up with our own home men. I see Professor Jenkins is on the program to follow me, and I do not know but that is a good plan. We have heard some very fine things from our friends who have come to us from other states, and if we can apply them here among ourselves it will make the meeting of some use to us. It is not always possible to get all the good from the meeting that we ought to get because we do not put in practice the things that we hear.

My subject, as the Chairman has announced, is "The Best Way to Improve the Dairy Cow." Now possibly there are several best ways. I will not attempt to say at the present time, but I am going to tell you one way I know of to improve the dairy cow, and what I want to do is to discuss, if possible, in a broad way the dairy cows of Connecticut. This is the annual meeting of the State Board of Agriculture, and I am going to confine this proposition to the cows of Connecticut. The census of 1900 showed that Connecticut at that itme contained 126,434 cows on farms and 6,087 in towns and villages, making a total of 132,521. The average production of milk per cow is given as 545 gallons, or 4,695 pounds. This is a considerable increase in production over the figures given in previous census years.

Now I have prepared some figures here which show the increase from 1850 on, taking it by periods of ten years each.

Year	No. of Cows	Production	
		Gallons	Pounds
1850	85,461	301	2,588
1860	98,877	277	2,382
1870	98,889	291	2,502
1880	116,319	325	2,795
1890	127,892	425	3,655
1900	126,434	545	4687

These figures show a considerable increase in quantity of milk given per year since 1870. I think the average production for 1900 is too high. Of course, these figures are approximate, but they show a considerable increase in the quantity of milk per year since 1870. It will be interesting to note the result for the decade ending with 1910. The figures given are only approximately correct, as very few farmers weighed the milk, and accurate figures could not be obtained by the census-takers. Now just what is the comparison of our cows with those of other states? Four states show a larger production per cow than Connecticut. They are the District of Columbia, 680 gallons; Maine, 574 gallons; Massachusetts, 572 gallons, and Rhode Island, 540 gallons. You see, taking the average that is over 800 pounds per cow more than Connecticut. That is the District of Columbia. There are more cows probably being milked now than in 1900, but I do not think there are more cows now than there were two years ago. I am of the opinion that the average production would be found not to exceed 4,500 pounds per cow, if actual weights were taken instead of estimates. If milk is valued at three and eight-tenths cents per quart, or one dollar and seventy-seven cents per hundred, the average income per cow per year for the milk is seventy-nine dollars and sixty-five cents. I have not been able yet to find anybody among the farmers that would agree to allow me to put the price of milk at four cents on the average for the whole State. Is there anyone here who knows about milk who would say that the average farmer gets four cents? We will soon have four cents, I think. There are some men who are getting it now, but when you get north of Hartford, up into Mansfield and Woodstock, you will find that the average price is quite a little below four cents. At one dollar and seventy-seven cents per hundred, the average income is seventy-nine dollars and sixty-five cents per cow. Adding three dollars for the value of the calf and eight dollars for the value of the manure, makes the total income per cow ninety dollars and sixty-five cents. You can carry that in your minds quite easily. In my opinion, from the State of Connecticut conditions, ninety dollars per year is the greatest income from the average cow. Now let us see what it costs to keep the cow. The cost of keeping the average cow for one year is as follows; not the cost of keeping the good cow, but the cost of keeping the average cow. I have put in four tons of silage at three dollars and fifty cents a ton, fourteen dollars. One of our speakers last night said that silage was worth five dollars a ton. Silage in comparison with other feeds is not worth five dollars a ton, and it does not cost you that. The College farm at Storrs charges their department four dollars. I put the price here at three dollars and fifty cents. Then next one and one-half tons of hay, at sixteen dollars a ton, twenty-four dollars. Then I have given half a ton of grain at thirty dollars, fifteen dollars. Then I have added twelve dollars for pasture, depreciation in value eight dollars. Interest and insurance, five dollars; labor, twenty dollars; bedding, two dollars, making a total of twenty-two dollars for those items, and footing our cost of keeping the average cow for one year shows just about an even hundred dollars.

In comparison with the cost of keeping the average cow the following table shows the cost of keeping a good cow.

4½ tons of silage, @ $3.50,	$15.75
1 ton of hay,	16.00
1 ton of grain, $30; pasture, $12,	42.00
Depreciation in value,	8.00
Interest and insurance,	7.00
Labor, $28; bedding, $3,	31.00
	$119.75

The income from the good cow should be at least 6,500 pounds of milk per year, which, at the same price allowed for the average cow, would equal $117.05. Adding to that the value of the calf at five dollars and the manure at ten dollars, we have a total income of $132.05, or a net profit of twelve dollars and thirty cents, as against a net loss of nine dollars and thirty-five cents on the average cow.

QUESTION. What is the reason of selling her calf for five dollars and the other for three?

Professor TRUEMAN. I put it on this basis that every 6,500 cow ought to have a calf that is worth five dollars for any man to raise, and he takes his chances on the other one.

I am fully satisfied that these figures represent very closely the relative value of the good cows and the average cows of Connecticut. If the value of the milk is raised to two dollars per hundred, as it is at the present time, the difference in the net profit received from the two types of cows will be increased from twenty-one dollars and sixty-five cents to forty-four dollars.

QUESTION. Why do you increase the cost of labor in one case over the other? I see you have made an increase of eight dollars.

Professor TRUEMAN. Because you have got to take better care of the good cow than you have of the poor one. You have got to spend more time, and perhaps have a better man. In other words, if your cow will give you 6,500 pounds of milk you are going to take better care of her than you will of the cow that gives you only 4,500. I think one of the items between the 6,500 pounds and the 4,500 pounds is that represented by the eight dollars for the increased amount of care and labor that you put on that good cow. The bedding that I put in here at three dollars costs more, probably five dollars. I do not know as I could get out of it for five dollars, but I put it down at three dollars to be conservative, and also because in many instances there is very little cost attached to it. I am fully aware that there may be some little difference of opinion about these prices, but if you go over the list you will find that there is no very great wide differentiation from these figures. One man may have his boys do all the work before they go to school, and another man may have to put out hard cash for labor. Some of them may have boys who work for love, and in the case of a man of that kind, he does not have to figure his costs as anything. But that is not putting it on a commercial basis. I believe in putting the boys to work, and the sooner we realize the fact that we are taking more out of the herds when we make the boys do a little something about the place, the better. I believe in letting them take their part, and learn how to do it, rather than educating them away from the farm.

In order to bring clearly before us the difference it would make to the whole State if all the cows were good, or, in other words, if the average per cow were 6,500 instead of 4,500 pounds, we will multiply the total number of cows on farms first by the net loss of nine dollars and thirty-five cents, which gives a total of $1,180,000, and means that we are selling farm crops to our cows for that much less than their market value. Multiplying the total number of cows by twelve dollars and thirty cents net profit received from the good cows we get a total of $1,555,000, which is the increase over market price for the farm products that we have got by feeding it to our cows. If now we add the two sums together we get the difference between the average cows and the good cows, and we find that it amounts to the sum of $2,337,000.

It is not necessary to bring to your attention any more figures to prove that there is need of a change in the average cow. The question that is of vital interest is how the change can be brought about. Undoubtedly, the first move is to weed out the very poor cows. We would naturally think that would not be necessary to say to a Connecticut Yankee, "Weed out your very poor cows." Our experience teaches us, however, that it is necessary. The number of men who are weighing the milk from their cows, and thus getting accurate information concerning their value, is remarkably small. All kinds of excuses are offered for this failure to adopt a plain commonsense business-like method of handling the herd. A man who fails to study his cows and weed out those that are really worthless should never complain of his failure to make money dairying. We need to get rid of the cows that are really poor. Of course, I have not time this afternoon to go into the method which you are going to adopt in order to do that, but many of you know what I have said before you time and time again, to the effect that you ought to weigh your milk at least often enough to know what each cow will do. The weeding out of the poor cows would reduce the total volume of milk produced, but even that might not be a bad thing for the country. The price of milk has been below the cost of production for some years, and a scarcity of supply might help to put the price where it belongs. I would not advise the farmer to worry over that phase of the subject. The milk dealer and the people will get enough to supply their wants. The weeding out of the poorer cows, however, will cut off one source of loss to the dairyman, and his total profits will be larger from the smaller number of cows.

QUESTION. What is he going to do with those poor cows?

Professor TRUEMAN. Some of them it will pay him to put in condition and turn over to the butcher, but the trouble with that proposition is that they are not always turned over to the butcher to be put into beef. A cow, and particularly a heifer, which is turned over to a butcher may be led away to be butchered, or may be led away to be sold again, so that that does not necessarily improve conditions.

QUESTION. You mean that the butchers sell them to other farmers?

Professor TRUEMAN. Yes. They sell the cows to other farmers to improve their cattle with. You can see what the result would be if that was practiced on any large scale.

QUESTION. I know a butcher that bought some heifers and then resold them to a farmer in just that way.

Professor TRUEMAN. He got caught.

QUESTION. Don't you think, Professor, that it is a mistake to judge a cow by her first calf, or by what she does after she drops her first calf?

Professor TRUEMAN. It would be very hard for me to apply the rule rigidly. Here was a cow, suppose she made 5,000 pounds, and was a nice cow. I should feel that possibly I was making a mistake if I condemned her with her first calf, so that you understand that no arbitrary rule will apply to all conditions. As I have said, there may be places where we will practice the rule, but the idea, of course, is not to cut out stock which gives promise of doing well.

QUESTION. You cannot apply that rule as to a bull. You do not know how the bull is going to develop until he gets along.

Professor TRUEMAN. Of course, in developing a good dairy herd, you have got to have a good sire. The sire is a very important element. That has been discussed here already. I am going to take that up as I go along with my paper.

Now right along the line of weeding out these poor cows. Selection is a very important word in the farmer's dictionary. We are obliged to take what is born into the herd just as they come. We cannot definitely determine whether good or poor calves shall be dropped, but we certainly are not obliged to raise them all to maturity, and feed them to all ages. We can select from the lot those that are profitable for us to keep. We have eyes, and we have hands, and we have brains, and we ought to use them all in selecting our dairy cows. Get rid of the poor cow, the unprofitable cow, and never mind if she is a pure-bred Jersey, with a beautiful fawn complexion and a black tongue and switch. If she is not of dairy type, and if she is not a producer, send her to the butcher. One wide-awake breeder in Connecticut has every cow that will not produce six thousand pounds with her first calf butchered on his own place. He knows then that she is not abused, and she is killed while young so that her meat is tender. Do not imagine I am hitting the Jersey breeder alone. The Holstein man will raise everything that is black and white, good, bad, and indifferent, and so with all breeds. We need to select more closely, and to set a higher standard as our ideal for dairy cows.

I know what the temptation is. If your cows have cost you a hundred dollars apiece you hate to sacrifice them. The good dairy cow is worth a hundred dollars today. But any man making milk in Connecticut today has got to select his cows with an eye to production, and if a cow is only giving him 4,500 pounds, and the figures of her keep are as I have given them and as seen on this chart, he is not making any money.

The cows that are left to us after we have disposed of the poorest ones will still be found below our 6,500 mark. The next thing to do is to improve our methods of breeding. I wish I could impress upon every breeder and keeper of cows in Connecticut, the importance of using a first-class dairy sire in his herd, a sire that has come from a long line of heavy milkers. We have not time today to discuss at length whether you shall keep your herds by buying or breeding. That is a point which every farmer has got to decide, to some extent, for himself. All I can say is this, if you are going to buy, buy good ones. Do not lead home a cow that will give you only four thousand pounds of milk, no matter what her price is. She will be a loss to you for her keep. If you get her for nothing you will still be out of pocket on her in time. She is a disgrace to you at any price, as she shows conclusively that you do not know how to conduct your own business. Pay for good ones, even though they cost you a hundred dollars apiece. The sure way, the safe way, the healthy way, is to raise them. Do not go and pay five hundred dollars for a good cow to improve your herd. Select your good milkers and breed them to a bull that came from a five hundred dollar cow. The price that you have to pay for that bull is the stumbling block in the way of the farmer. He is not extra well supplied with ready cash, and it looks extravagant to put one hundred dollars into a bull calf, or even into a yearling, but let me assure you it is the cheapest way you can improve your herd. It is money that will bring you back the biggest returns of all you invest. Hundreds of farmers are using scrub bulls from scrub cows, while hundreds of well-bred bulls from good cows are being sold at prices far below their real worth. The two simplest ways, and the easiest way to improve the dairy cow are, first, good selection, and secondly, intelligent breeding.

Now there is another thing that I want to say. How are we going to get this thing started through the State of Connecticut? As I said when I opened my talk, one of the difficulties in our meetings was not being able to get the farmers to practice the things that we talk about. Now what good does it do a man to know how to improve a condition which confronts him unless he takes advantage of the knowledge which he has which will enable him to remedy it? Now how are we going back into the hill districts of this State where ambition is low, where work is plentiful, and where the life of the average farmer is hard and terms are poor? How are we going to get this thing started in these districts of the State where the necessity for it seems to be the greatest? I have studied over that phase of the problem a good deal. It is not a condition which is peculiar to Connecticut. In fact, it is true of every state. In Massachusetts, they have men who are employed to go around, doing extension work, endeavoring to show the farmers how they may improve their conditions in this line. They are spending money and employing men to go and try to work out on the farms just such problems as I have been talking about with you. We are sometimes asked why we do not get some of our work out into the State, why we ourselves do not get out into the State more, so as to give an object lesson to the farmers. We are told about Wisconsin. We sometimes hear it said, why do you not have two or three men that are recognized as good sensible men that can take some of these farming problems in hand in our back towns, send them out and get them to work on those problems. Now, farmers, we would like to help you on this problem. The College is doing something. We go about the State and attend the institutes. We tell you what they are doing. If you will come to us, we will talk with you about their herds and about your rations, and do our best to show you how to get better rations for the least cost. We will see if we can pick out a good bull for you at fairly moderate prices. We would like to get out more than we do, because, as I say, we have often been asked why we did not send a man, perhaps, to a certain place to spend a day or two, or three days, and thus try in some systematic way to get the knowledge that we have about these problems into the minds of those who can make the best use of it. We are asked why we do not do that from the institution. Well, we cannot do it to any great extent because we have not got the money to pay the men with. The federal government gives us fifty thousand dollars for the teaching work at the College. If we could touch it, we could use some of that, but the law requires every cent of it to be devoted to the academic department. The Experiment Station is given a certain sum of money, something over fifteen thousand dollars, but that does not allow us to do work of this kind. We did two years ago start the testing of herds. We tested four herds. We did not go out into the poorer districts of the State because we did not succeed in picking out farms so we could do that with advantage. Of those that we did pick out, three of them were good herds and one was a poor herd. We had gotten along with the work when we received word that no more money could be used for extension work. All of the money they gave us had to be used for other purposes. That means that we do not have the funds with which to send men out. I leave it with you that it is barely possible that the State of Connecticut should invest a certain amount of money in this kind of work. I hope something may be done about it. The University of Illinois gets something like fifty thousand dollars a year from the state, and that, of course, they can use in any way. Massachusetts is doing this same work, and is furnishing money to do this extension work. I hope that the time is soon at hand when the State of Connecticut may appropriate a sum of money for that purpose, and so that we may go to the dairyman and the fruit man and the poultry man, send them men expert in the work to carry the information that has been dug out by the men that have been successful to the farmer.

Now we have a Dairymen's Association, and also our State Board, as well as a large society devoted to the fruit interest. There is a possibility in the near future some scheme may be worked out whereby the State Board of Agriculture may encourage this kind of extension work among the farmers. The State Board of Agriculture in Maine, without costing it practically anything, has a man who is supervising the cow-testing associations. I do not know of any place where they are as rapidly weeding out the poor cows, and improving the dairy cows, and general dairy conditions, as they are in the state of Maine. They are doing a whole lot, and the farmers are paying that bill by putting three hundred dollar cows in the association. Thirty or forty men, each man paying a dollar a year per cow for the work done of weeding out the poor cows from the herds of that state. It is bound to result in a very great improvement.

Now I am going to stop because there is still considerable on the program, and I am going to leave this subject with this suggestion; that in order to do this work of improvement throughout the State, it might be wise for the State to appropriate money for that purpose, specially, or it might be wise, for the State Agricultural Society to take the matter in hand. Of course, anything that we can do at the College we will do. I may say this: I am at home. At any rate, I feel as if I was at home, because I was born just over the line. People here seem to be a good deal the same as the people over there. Some of us are willing to get up and hustle a little and do things. Some of us are handicapped so strongly that we are hardly able to push our way up. Those of us who have the will to do should help the man who is handicapped, and, so far as we are concerned, we will help all we can to push those men up. We are ready to do it, and I believe that the time is coming when we can do it, if not by 1910, certainly before very long. The dairy interests of the State must be improved, and we must do something to breed these cows up somewhere near the seven thousand pound mark.

I thank you.

The President. We have had two very excellent talks at this meeting on alfalfa. Now while we are all here, and before I introduce the next speaker, I want to ask the men in this audience that are raising alfalfa to raise their hands. I thank you. I see there are some. If I am alive the next year, I want to ask the same question. I hope there will be five times that number at the next convention that will raise their hands. I have been at it for some little time. I had my failures at the start, but anything that is worth doing, and that is worth anything, is worth striving hard to do. Anything that we can get without working for I would not give that for. I have had for two years on my farm two acres of alfalfa that have done well. Last year I had four acres, from which we cut four crops. One thing that has not been touched upon by these speakers was the ability of alfalfa to stand drouth. On one lot where we have that alfalfa this year, we would not get any more grass there than there is on this floor in August, but we had a splendid cutting of alfalfa, and as green as anything I ever saw out of doors. Now we have made plans to put in quite a good deal more. I feel so well satisfied with it today, that I am going to take the good Kentucky Colonel, who gave us such a good talk last night, over to see it, and I do not think that he will say I ought to be ashamed of it.

Now I said last night that we had an excellent corn exhibit in connection with this meeting which every man in this hall ought to feel proud of, and it is, to a very large degree, due to the instructions and the good work that the next speaker has done in the interest of corn breeding and corn raising in the State of Connecticut. I take great pleasure in presenting to you now Dr. E. H. Jenkins, whose subject is to be, "Every Farmer His Own Corn Breeder."

EVERY FARMER HIS OWN CORN BREEDER.

By E. H. Jenkins.

The question which I wish now to discuss is: In what ways can the farmer, without special knowledge of the theory and practice of scientific breeding, or without time to put his knowledge of these things into practice, increase his yield of corn with profit? I assume that he is not looking for prizes at corn shows, nor exceptionally high protein or fat content, nor even an unmixed clean single variety. He just wants more corn, the most corn he can get from an acre.

The size of any crop always depends on two sets of conditions. First, the externals or surroundings of the crop, such as light, heat, rainfall, fertilizers, tilth, etc., things which I shall not dic-cuss here, and second, the inherent productive capacity of the seed which is planted. How to increase this capacity of the seed without undue cost is what I shall talk most about.

Let me illustrate what I mean by "inherent productive capacity." Doctor East, of our station, as well as many other observers, has often found that where two rows of the same variety of corn are planted side by side, each from the kernels of a single ear of a variety grown in the same field, and the two ears to all appearances exactly alike, the yields have been very different; for instance, the row planted from one of these ears yielded at the rate of seventy bushels per acre, while the yield from the other ear was only forty-five. Sometimes, too, a small, inferior looking ear has given a greater yield than a large, fair ear. Both had the same chance, but one had the power to use this chance much better than the other, while nothing that could be seen about the seed showed it. This is what I mean by greater inherent productive power.

Now, whether we raise fifty bushels of corn or one hundred per acre, our expenses of dressing and fitting the land, of planting and cultivating, are the same in either case, and the cost of harvesting, storing and selling is not very different. The weather conditions are the same. We may call then "fixed charges." With those things fixed, the yield and the profit or loss are determined by the inherent productive capacity of the seed we sow. To increase this producing power of our seed is to increase our crop without increased expenses.

How to originate new and better varieties than we now have in the shortest time and with least expense is a harder problem in the case of corn than in that of any other cultivated crop, because of the infinite number of crosses already made and the great difficulty of preventing constant accidental crossing.

The scientific study necessary to determine how various desirable characters are inherited and how transmitted by crossing varieties of corn is work for the experiment station and a specialist and has been carried on for some years at our station by Dr. East. His papers, printed in our bulletins and reports, contain some discussions not easily followed by any but an expert, but they have made a valuable advance in the knowledge we need and contain many hints of present practical value.

I cannot miss this chance of saying, in passing, that the station is grateful to the farmers of this state for their willingness to let the station remain true to the objects for which it was founded:— that is, to quote the statute, " to promote agriculture by scientific investigation and experiment."

Each year has witnessed some scientific investigation of which the immediate practical value was not clear to many. In each report there has been something of no immediate profit to the average reader. But my own belief is that in the end the practical farmer has got and will get as much cash return from this work as from the anaylsis of feeds or fertilizers and that the agriculture of the whole country will share in this return.

But while I believe that the introduction of new varieties of corn, better than what we now have is unlikely, till our knowledge of heredity as applied to corn breeding is greater, a great improvement of our present varieties is possible by selection. The most careful and systematic work in selection will, of course, be done by the men who make a business of it, who grow and sell corn for seed on a considerable scale and who are in a way professional corn breeders.

Some of our present varieties have been greatly improved by the care of those who grew them for years. A more rapid improvement will follow better knowledge of breeding and hybridizing and the efforts of those who have special aptitude and give their whole time to this branch of business. In our reports full directions have been given for carrying out this work in the best way by those who wish to undertake it.

But I am considering the man who is raising corn for his own use, not wholly or largely for sale as seed, and am asking what he can do to increase his corn crop by improving his seed.

First, seed corn should always be selected and marked in the field, before cutting. There alone you see the parent that bore it and the conditions about it. You will select stalks of medium height, with strong stems, good brace roots, broad healthy foliage and a well grown tassel and which bear good ears at a proper height from the ground, covered with a moderate thickness of husk, and which stand in and near perfect hills. The qualities of the mother we all understand are much more important than the looks of the offspring.

Here is a hill, for instance, with only one stalk;— the crows got the other two. It bears one large, well capped ear. But this ear's superiority is, in part, perhaps wholly, due to the extra light and plant food which accident gave it, and not to its inherent, inherited excellence. But inherited excellence is the very thing we are after. The probability is that its kernels next year will give no larger yield than a smaller, less perfect looking ear from a full hill somewhere else. But this good looking ear any one would be likely to pick for seed if he made the selection in the winter or spring from his crib and only from the looks of the corn.

If corn in a prize exhibit is to be judged only by the size, shape and looks of the ear, with no conditions as to the way it was raised, the proper thing would be to plant a small plot with one stalk to the hill and hills four feet apart each way.

We have done that and got noble looking ears, with nearly twice as much shelled corn *per stalk* as from that which was planted at the proper distance. The reason was that each plant had all the light, air and fertilizer that it could use. Its ear, of course, was exceptionally large and perfect. With ordinary planting no stalk has this chance. We plant to get the most *per acre*. In this way we limit the possible yield of the single stalks.

Now, if you select from a stalk next a missing hill, because the ear is uncommonly large and fine, you are selecting because of merits, due perhaps wholly to accidents which are not merits that will be passed on to the next crop;—that is, "heritable" merit. Accidents are not inherited.

Reject, of course, all ears that have faults that you can see without husking. But this selection is chiefly concerned with the qualities of the mother plant and is very important, though only preliminary.

Don't take ears from a stalk with malformed or feeble tassel. The tassel gives as much of an indication of vigor, or the reverse, as the ear.

At cutting time gather all these selected stalks and stack them by themselves, with some other stalks to thatch them if you like. Go with the hired man for this. Don't send him alone. He will be sure to mess it.

Don't let anyone husk these selected ears but yourself. On your judgment and care now depends the size of your corn crop next year. If necessary, have the seed stack hauled to the barn, where you can be warm enough to use your head for judging seed, instead of for blowing on your fingers.

You will throw out now all ears that have real faults, such as spaces between the rows and hybrid kernels, perhaps too those with uncapped tips, though that is often caused by the accident of incomplete pollination and not, therefore, likely to be heritable. You will save those which husk easily and have uniform, deep, wedgeshaped kernels with large chits or germs. Fancy shapes, colors, shape of the dents, etc., you will leave for those who engage in elaborate corn judging contests and who can perhaps give sound reasons for their choice. You are looking solely for seed that will give you the biggest crop of sound corn, and you don't care to make a selection for which you cannot give a good reason to yourself.

When this is done you have got seed, every ear of which came from a vigorous, well-developed mother, and shows the qualities which you want in next year's crop. You cannot go to your crib next spring and pick out such ears. And when you buy shelled seed corn by the bushel you know that it may have come from hundreds or thousands of plants, with as many various characters and producing capacities.

Whether you will husk the selected ears or leave a part of the husks on depends on how you will dry and cure it. The seed needs very different handling from the main crop. It should be separately and more carefully stored, out of the possible reach of vermin.

There are several good ways of curing seed corn and I do not need to describe them in detail. For instance, enough husks can be left turned back from the ear to braid them together in long strings, which can be hung in a dry cool place, out of danger of freezing till thoroughly cured. The husked ears may be laid on wire netting racks, or fastened singly on nails driven through a board, as has been described in our report. This last arrangement is shown in our exhibit down stairs.

But the essential thing is to have a free circulation of dry air all around the ear and so to dry out the corn thoroughly and rapidly, without any chance of swetting and molding.

Mild artificial heat is a good thing if you can have it. A quick dried corn is likely to germinate better than one slowly dried.

Mold easily starts where you don't see it and generally down in the germ which it kills or weakens. The damage may not show at all, but you will see it later, either in your test of vitality or, worse yet, in your field.

On the other hand, corn which has to be harvested while quite immature, if very carefully cured, may germinate well. Some years ago a good ear of Stowell's Evergreen in prime eating condition was carefully cured at the station and yielded ninety-five per cent. of kernels which sprouted quickly and vigorously.

Crib-cured selections are much more likely to include ears damaged by sweating and molding than selections which have been handled as precious seed and not as so much cattle feed. Corn saved for seed cannot be too carefully watched, to prevent damage from molding. When husked it will contain from twenty-five to thirty-five per cent. of water. It is not safe from damage by mold till it has less than twelve, in my opinion.

When your seed corn has come through the winter in perfect condition, the next thing is to find whether the kernels of every ear are all alive and whether they will sprout promptly and vigorous. You cannot tell *certainly,*— and the key of success is to be certain, so far as certainty is possible,— unless you test each particular ear *by itself.*

The famous exhibit of Illinois seed corn at the St. Louis Exhibition was composed of ears which would not grow. The ears were sent there just because they were valueless as seed corn, although large in size and beautiful in appearance, and this was perfectly fair, for it showed all that the visitor could ask to see, the *looks* of good seed corn.

Now each ear is an individual, and it is safe to assume, where one variety has been grown by itself, that all its kernels are nearly alike in their vitality and crop-producing power.

Ten or twenty kernels taken from different parts of this ear will show about the same average vitality as the average of all the kernels on the ear. Ten, or better, twenty kernels taken from different parts of each ear will, therefore, give a fair test. If you lay your ears in a row and put these seeds taken from each ear in corresponding rows in your testing box, it is easy to keep run of them.

The testing seed should lie in damp sand, or clean sawdust, or in folds of damp woolen cloth, where they will have sufficient, but not excessive moisture, enough air, and a temperature of seventy-five to eighty degrees. Watch them and dampen them when necessary and count them in about three days from the time they are put in. Make a note of the number from each ear that sprout, and sprout vigorously, and take for seed only those ears from which at least nine-tenths of the kernels sprout quickly and vigorously. This is the final selection.

" But what is the use of all this monkey business?" says someone. " Fooling with seeds and wet sand and sprouts might amuse the children, but I haven't got time to waste. I can tell whether corn will grow well enough by the looks of it." But I would answer such an objector: You have got hold of one good idea and two pieces of foolishness, which isn't so bad — taking us as we run on the average. Seed testing can be done by children when they have learned the trick and the importance of it and understand that it is real business. It is a kind of nature study and a better time and place and teacher of nature study than the common school. But it is not time wasted when you do it yourself, and you cannot tell whether corn will grow perfectly by looking at it.

The object of corn testing is to get as perfect a stand as possible in the field, to avoid those missing hills and missing stalks which cut down the yield, and those feeble, backward plants, which are little better than weeds. You will spend just as much for labor and fertilizers on a field with an imperfect stand as on a perfect one, and you will get less money for it. Every missing stalk is money out of pocket.

For instance, if you plant an eight-rowed flint, three and one-half feet each way and three stalks to the hill, it will take at the most about twenty-eight ears to plant an acre. From such a stand, let us suppose you get one hundred bushels of corn. Suppose four of those ears germinate only seventy per cent. You cut down your yield by nearly five bushels of corn and the equivalent of stover. At present prices, will not five bushels of corn pay for testing twenty-five or thirty ears? One of the speakers yesterday said his seed testing cost him nine cents an acre.

In some years the number of poor ears will be less than this and in some years a good deal more, and the point I make is that you cannot insure against a poor stand, except by *testing your corn before it is shelled.* After it has been shelled you can test its vitality, but if it is poor you can't do anything to help yourself, except by planting extra kernels and thinning out. You *can't separate the poor seed.* You can, if you test it before shelling.

The next point is to shell off the very small seed from the extreme tip and perhaps the large and misshaped seed from the butt, if you are going to use a machine planter. The use of this is to have your seed uniform in size, so that your planter will drop them uniformly. Then it will pay to test your machine plate on the barn floor, to see that the holes are right for your seed and, if they are not, make them right by filing. This is rainy day work long before planting time.

Then you can go into your field with some confidence that you have done your part towards getting an even stand and a quick start for the crop. Without attending to these things you cannot fairly blame the crows and the weather for missing stalks and a short crop.

Now, does all this seem very simple and primary school talk for a man to give to corn growers of experience? It certainly looks rudimentary.

A man looks more like a business man when he is hauling a load of fertilizers or turning under a clover sod for his corn than when he is counting and testing kernels of corn or filing the plate of his planter. But of what use are clover sod and fertilizers under dead or weak seed? Why do we spend labor for that which satisfieth not? Toil and sweat as we will, the return we shall get from an acre of land and the work we spend on it depends after all on those ten or twenty ears of corn hanging in the seed house. The very beginning of farm wisdom is to have the very best possible seed.

I am urging attention to certain details which most of us understand, but which often do not get attention at the right time, because they are not showy and do not call themselves to our mind by their effects at just the time when they need this attention.

There is good reason to believe that, with such varieties of corn as we have, a general following of the practice above outlined would increase the average yield per acre of corn in this state by five bushels.

Now let us review what the farmer is gaining by the work I have suggested: In the first place, his seed testing and care in fitting his planter will make the stand of corn in his field as nearly perfect as accidents of the season will permit. Missing hills and missing stalks will not be his fault. This improvement affects only his next crop.

In the second place, he is using seed from those plants which show a distinct superiority to the average of his crop; as the breeder puts it, he is improving by the selection of "variations." This improvement is more lasting than the other. It sifts out from the variety undesirable strains, leaving the more productive. For there is not a variety we have that is not a mixture of many different inheritances, some good and some poor.

The experiments made in Illinois have shown that, by taking great care to limit the crossing of the selected corn with unselected plants, it is possible in a term of years to get corn which will be very much richer in protein or fat than the stock from which the start was made. A similar gain is possible in the total yield of corn, if that is the quality for which the crop is bred. Of course, there is a natural unknown limit to this change, for we cannot get a corn that will be all protein or half protein.

Similar work with the sugar beet has increased the average percentage of sugar from less than six to perhaps sixteen per cent., with individual beets showing as high as twenty-eight per cent. Further than that breeders cannot go. It is the limit for sugar in beets.

The corn breeder too finds the limit set by nature to the yield from his seed selected by the ear-to-row method which has been described in our reports. The yearly gain in yield, which may be large at first, is much less in following years, till a further increase is impossible. With care it may be held where it is, but without continued care the corn, like the sugar-beet, will go back to its original average yield. This I think explains in part why seed corn bought from some breeders at the west is said to deterior in this state. Difference of climate, soil, etc., partly explains it, but in part also its change is because the seed selection is not made here with the care and skill which the breeder used, and it may soon be much mixed with inferior strains, for we all understand too that corn is the hardest of all our crops to keep true. It is constantly crossed with other types, varieties, or strains, and this is what makes the work of the breeder particularly hard.

The more permanent gain is only to be got by completely breeding out of a variety undesirable characters, or breeding into it some new character, and to do this with any certainty we need more knowledge of the laws of inheritance than we now have.

One thing more seems to me possible for a practical farmer to do to increase his corn yield and Dr. East's experience in the last few years has proved its value. We have in this state a considerable number of well-bred, fairly pure varieties of Flint, Dent and sweet corn. There is the Newgate Flint of Mr. F. B. Walker, of Granby, Mr. Stadtmueller, of Elmwood, has a Yellow Leaming, Mr. G. A. Hopson, of Wallingford, the Longfellow, the Hoyt, of New Canaan, an Early Mastodon, Mr. N. S. Brewer, of Hockanum, the Brewer Dent, Mr. C. S. Phelps, of Canaan, an Early Sharon, and so on.

The farmer himself may have, in very many cases does have, a variety which he has bred carefully and which gives fair return, but not so much as is perfectly satisfactory to him.

Dr. East has proposed and carried out very successfully on a small scale for two years the following plan of hybridizing. It is based on the fact that a cross between two related but distinct and fairly pure strains of either animals or plants has been found in many cases to produce in the next generation an offspring having greater vigor and hence productive capacity than the offspring of in-breeding. He has proved it to be true of corn. It puts into the corn "new blood," as we say, not in helter-skelter fashion, but in a careful way. How or why it does it we do not know. We have got the fact ahead of the explanation.

The owner plants two well bred, distinct varieties of corn in alternate rows,— Longfellow and Sanford, let us say. A row of Longfellow, then one of Sanford, another of Longfellow and so on. A tenth of an acre may be enough, twice as much land as would give the seed he wanted if he were to use all the ears for seed. If the rest of the field is planted with either one or the other of these varieties, this breeding plot may be a part of his main corn field. It is all cultivated alike, but as soon as the tassels begin to show, he goes through this breeding plot and carefully pulls out the tassels from the alternate rows. If he grows Sanford for his main crop, he detassels all the rows of Longfellow corn. This variety must not be allowed to shed any pollen and so to fertilize its own silk. The ears on all the stalks of this variety must receive only pollen from the other variety, thus insuring a complete cross. The owner must go through the plot four or five times, perhaps, at intervals of a few days, and do the work *thoroughly*.

At cutting time he stacks separately the stalks from these detasseled rows, which will bear only ears certain to be a cross of the two distinct strains. This is the seed for next year's planting, to be cared for and tested as I have already described. He will also save, from a distant part of the field and with his usual care, some seed of the variety which he has formerly grown.

The next season he will plant the main crop from the cross got the year before and besides it some of his own variety for comparison, to note the increased yield from the cross. At the same time he will plant a breeding plot just as before, but at a distance from his main field, or protected from it by two or three rows of a tall ensilage corn which tassels too late to interfere by crossing on his seed plot. Thus, then, he gets each year a fresh crossed seed for next year's planting.

Last spring a number of corn growers in the state undertook this work and twelve or more report a successful cross and enough seed for testing the yield next year. We hope to have some of these hybrids growing in our demonstration field next year, with the parent varieties next to them, so that those interested can see the results and judge for themselves of the value of the method.

More corn, more alfalfa, more clover, more manure and more humus in our soils; less boughten feed, less commercial fertilizer in consequence. These are the things to work for. These are the things we are getting.

The PRESIDENT. This closes our program. Our Secretary has worked hard to make this an interesting meeting, and to furnish you with a list of speakers to talk on subjects that would be of value to every farmer of the State. I think you will agree with me that he has succeeded well. You have attended in goodly numbers, and have given close attention to the speakers, and have been very respectful to your presiding officer, for all of which I thank you.

I now declare this mid-winter meeting of the State Board of Agriculture adjourned without day.

AGRICULTURAL FAIRS IN CONNECTICUT, 1909.

Delegate.	Name.	Place.	Date.	President.	Secretary.
E. E. Brown	New London County	Norwich	Sept. 6-7-8	E. J. Miner	T. W. Yerrington
B. C. Patterson	Windham County	Brooklyn	Sept. 7-8-9	H. H. Davenport	J. B. Stetson
G. A. Cosgrove	Beacon Valley	Naugatuck	Oct. 12	M. E. Bronson	J. P. Hogan
C. A. Thompson	Berlin	Berlin	Sept. 14-16	C. M. Jarvis	F. L. Wilcox
	Conn. Fair Ass'n Inc.	Chart. Oak P'k	Sept. 6-11	Walter L. Goodwin	Hartford
L. H. Healey	Chester	Chester	Sept. 15	Dr. Theo. Foster	D. F. Hood
	Clinton	Clinton	No fair	E. H. Wright	J. E. Bliss
L. H. Healey	Colchester Grange	Colchester	Sept. 23	M. R. Abell	C. E. Staples
	Danbury	Danbury	Oct. 4-9	S. H. Rundle	G. M. Rundle
C. A. Thompson	Farmington Valley	Collinsville	Sept. 9-10	Geo. J. Case	E. A. Hough
N. H. Brewer	Granby	Granby	Sept.	Geo. O. Beach	Theodore G. Case
Geo. A. Barnes	Greenfield Country Club	Greenfield Hill	Sept. 14-15-16	N. H. Sherwood	Mrs. D. B. Adams
J. B. Palmer	Guilford	Guilford	Sept. 29	R. S. Parker	Rob't DeF. Bristol
G. A. Cosgrove	Harwinton	Harwinton	Oct. 5	F. A. Cleaveland	D. K. Bentley
B. C. Patterson	Lyme Grange	Hamburg	Sept. 22	J. S. Daniels	J. Warren Stark
N. H. Brewer	Madison	Madison	Sept. 23	Chas. L. Hinman	E. N. Willard
C. A. Thompson	New Haven Co. Hort. Soc.	N. Haven Mus. H'l	Nov. 2-4	John H. Murray	Fred H. Wirtz
N. H. Brewer	New Milford	New Milford	Sept.	Noble E. Bennitt	J. E. Hungerford
W. L. Davis	New London Co. Hort. Soc.	Norwich	June, Sep. Nov.	S. A. Gilbert	Frank R. Allen
Geo. A. Barnes	Orange	Orange	Sept. 6-7	W. S. Woodruff	A. D. Clark
B. C. Patterson	Putnam Park Association	Putnam	Aug. 31, Sept. 1	M. R. Joy	E. M. Arnold
W. L. Davis	Rockville Fair Association	Rockville	Sept. 21-23	A. Kingsbury	F. J. Cooley
Wilson H. Lee	Simsbury	Simsbury	Sept. 29-30	J. O. Phelps, Jr.	A. E. Lathrop
G. A. Cosgrove	Stafford Springs	Stafford Springs	Sept. 28, 29, 30	W. H. Hall	C. F. Beckwith
J. B. Palmer	Suffield	Suffield	Oct. 12-13	O. L. Dart	J. P. Graham
	Union (Monroe, etc.)	Huntington	No fair	Thos. Morrissey	Dr. Thos. F. Martin
D. W. Patten	Union (Somers, etc.)	Broad Brook	Sept. 15	H. A. Middleton	Henry F. Fletcher
	Wallingford	Wallingford	No fair	M. E. Cook	D. W. Ives
L. H. Healey	Wethersfield	Wethersfield	Sept.	A. H. Griswold	C. E. Adams
D. W. Patten	Horseshoe Park Agr. Ass'n	Willimantic	Sept. ?	Chas. A. Gates	Frank P. Fenton
J. B. Palmer	Woodstock	So. Woodstock	Sept. 13, 14, 15	A. E. Brown	L. H. Healey, N W
Geo. A. Barnes	Wolcott	Wolcott	Oct. 13	W. A. Faber	E. P. Woodin
Wilson H. Lee	Conn. Horticultural Society	Unity H'l, H'tf'd	Sept.	J. F. Huss	Alex. Cummings, Jr.
W. L. Davis	Conn. Dairymen's Ass'n	Hartford	Jan. 19-20 '10	Wilson H. Lee	J. G. Schwink, Jr.
E. E. Brown	Conn. Pomological Society	Announc'd later	About Oct. 1	C. S. Gold	H. C. C. Miles
D. W. Patten	Conn. Bee Keepers' Ass'n	Chart. Oak P'k	Sept. 6-11	Allen Latham	J. A. Smith

OFFICIAL LIST OF SOCIETIES, HOLDING FAIRS IN 1909.

NAME OF SOCIETY.	PRESIDENT.	SECRETARY.	TREASURER.
Farmington Valley,	George J. Case,	E. A. Hough,	Benj. F. Case.
Union Agricultural Society of Barkhamstead, Colebrook & Hartland,	Leon A. Coe,	Homer P. Deming,	Homer P. Deming.
Conn. Pom. Soc.,	C. S. Gold,	H. C. C. Miles,	Orrin Gilbert.
New London Co. Hort. Society,	S. Alpheus Gilbert,	Frank H. Allen,	Frank H. Allen.
Union,	Howard A. Middleton,	Henry F. Fletcher,	Charles A. Thompson.
Stafford Springs,	W. H. Hall,	C. F. Beckwith,	Robert H. Fisk.
New Haven Co. Hort. Society,	John H. Murray,	Fred H. Wirtz,	David Kydd.
Conn. Horticultural Society,	John F. Huss,	George W. Smith,	W. W. Hunt.
Harwinton,	Frank A. Cleaveland,	D. K. Bently,	D. K. Bently.
Chester,	Theodore Foster,	Donald F. Hood,	Edgar W. Lewis.
Horseshoe Park,	Chas. A. Gates,	Frank P. Fenton,	William, L. Higgins.
Beacon Valley,	Marshall E. Bronson,	John P. Hogan,	William T. Davis.
Orange,	Watson S. Woodruff,	Arthur D. Clark,	Edward L. Clark, Jr.
Madison,	Charles L. Hinman,	Edward N. Willard,	Edward N. Willard.
Rockville Fair Ass'n,	Andrew Kingsbury,	F. J. Cooley,	Charles M. Squires.
Guilford,	R. S. Parker,	R. DeF. Bristol,	W. C. White.
New London County,	J. B. Palmer,	Theo. W. Yerrington,	Charles W. Hill.
Conn. Bee Keepers Ass'n,	Allen Latham,	James A. Smith,	James A. Smith.
Colchester Grange Corporation,	M. R. Abell,	C. E. Staples,	Belle L. Strong.
Conn. Dairymen's Association,	Wilson H. Lee,	J. G. Schwink, Jr.,	B. C. Patterson.
Berlin & Conn. State Agri. Soc.,	C. M. Jarvis,	Leland Gwatkins,	Frank L. Wilcox.
Simsbury,	J. O. Phelps, Jr.,	A. E. Lathrop,	Charles E. Curtiss.
Granby,	Geo. O. Beach,	Edgar B. Case,	Henry G. Viets.
Greenfield Country Club,	N. H. Sherwood,	A. C. Acker,	Eli Wakeman.
Woodstock,	Clarence H. Child,	Leonard H. Healy,	Melancthon Riddick.
Suffield,	O. L. Dart,	J. P. Graham,	J. O. Haskins.
Wolcott,	W. A. Faber,	E. P. Woodin,	E. M. Upson.
Conn. Fair Ass'n,	Walter L. Goodwin,	Walter L. Goodwin,	Charles Soby.
Putnam Fair,	M. R. Joy,	E. M. Arnold,	Richard Gorman.
Windham County,	George S. Cary,	Joseph B. Stetson,	William R. Thurber.

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ANALYSIS OF PREMIUMS AND GRATUITIES PAID.—FARM STOCK.

SOCIETIES.	Bulls.	Milch Cows.	Heifers.	Calves.	Working Oxen.	Steers.	Fat Cattle.	Horses.	Horses, Speed.	Sheep.	Swine.	Poultry.	All other Stock.	TOTAL.
Farmington Valley,	$20.00	$33.00	$10.00	$6.00	$20.00	$6.00		$11.00	$1,570.00				$4.00	$1,680.00
Union Agricultural Soc. of Barkhamsted, Colebrook & Hartland.	4.50	7.00	4.00	2.75	8.00	6.00		24.25		$8.00		$14.00	1.50	80.00
Conn. Pomological Society,														
New London Hort. Soc.,														
Union,	19.00	36.00	4.50	16.00	13.00	1.50	$5.00	16.00	15.50	5.00	$2.00	14.50	3.00	151.00
Stafford Springs,	59.00	117.00	56.00	50.00	171.00	29.00	9.00	59.00	168.00				59.00	2,289.00
New Haven County Hort. Society.														
Conn. Horticultural Soc.,														
Harwinton,	6.50	11.15	.75	1.75	55.00	21.50	1.00	17.25		3.00	2.50	50.30	8.05	178.75
Chester,	2.00	8.50	4.50	2.00	7.00	5.00		5.25				30.70		65.45
Horseshoe Park,	45 00	159.00	100.00	13.00	101.00	17.00	10.00	48.00		18.00	9.00	35.00	4.75	559.75
Beacon Valley,	8.50	17.75	5.25	2.25	43.50	10.00	4.00	16.00	320.00			37.85		465.10
Orange,	33.00	79.00	41.75	20.00	145.00	11.00	9.00	85.75		2.00	19.00	34.00	19.00	498.50
Madison,	1.25	5.25	1.25	3 25	14.00		1.00	2.00			1.00	29.11		58.11
Rockville Fair Association,	57.50	106.00	48.00	35.00	58.50	11.50	4.00	44.00	1,570.00	20.00	11.00	265.75		2,231.25
Guilford,	1.50	11.00	1.50	2.00	18.00	11.00	3.00	19.50			6.00	67.25	14.55	155.30
New London County,	94.00	307.50	39.25	53.75	133.00	15.75	17.50	104.75	1,830.00	115.00	58.00	122.00		2,890.50
Conn. Bee Keepers Ass'n.														
Colchester Grange Corporation,	2.00	6.25	3.75	1.90	5.25	3.50	1.50	9.00		1.00	2.00	7.65		43.80
Conn. Dairymen's Association,														
Berlin & Conn. State Agri. Soc.,	221.00	277.00	61.00	42.00	240.00	22.00	15.00	87.00	2,351.15	298.50	12.00	376.00	260.00	4,262.65
Simsbury,														
Granby,	20.00	30.00	18.00	7.00	15.00	14.00		25.00		11.00		35.00		175.00
Greenfield Country Club,	18.25	22.00	15.75	9.25				55.50		6.75	6.00	46.50	143.25	434.75
Woodstock,														
Suffield,												108.80		108.80
Wolcott,	22.00	45.50	21.25	20.00	63.00	11.00	2.50	20.00		2.00	2.00	55.00	26.25	270.50
Conn. Fair Ass'n.,	1,079.00	1,955.00	483.00	498.00				2,225.00	16,360.00	1,198.00	740.00	1,992.50	124.50	26,655.00
Putnam Fair,								75.00	1,000.00			43.50		1,118.50
Windham County,	30.00	73.00	84.00	30.00	125.00	50.00		80.00	325.00	36.00	6.00	45.00		884.00

ANALYSIS OF PREMIUMS AND GRATUITIES PAID.—CONTINUED. FARM PRODUCTS.

SOCIETIES.	Indian Corn.	Wheat.	Rye.	Barley.	Oats.	Beans.	Buckwheat.	Grass Seeds.	Potatoes.	Carrots.	Beets.	Parsnips.	Turnips.	Onions.	Other products.	Total amount for Grain and Root Crops.
Farmington Valley,	$2.10	....	....	....	....	$2.30	....	....	$13.95	$1.10	$1.50	....	....	$3.10	$8.70	$32.75
Union Agriculture Soc. of Barkhamsted, Colebrook and Hartland,	1.50	....	....	....	....	....	....	....	15.00	.50	....	....	....	.75	.75	18.50
Conn. Pomological Soc.,	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
New London Hort. Soc.,	....	....	....	....	....	....	....	....	....	.50	.50	....	$0.50	.50	5.00	7.00
Union,	2.25	$0.50	$1.25	....	$0.50	....	$0.50	....	8.50	.50	.75	....	....	.75	....	15.50
Stafford Springs,	18.00	1.00	2.50	....	1.00	14.25	1.00	....	74.00	1.75	2.25	$0.50	3.00	7.00	....	126.25
New Haven Co. Hort. Society,	....	....	....	....	....	....	....	....	....	1.50	....	1.50	....	1.50	....	36.50
Conn. Hort. Soc.,	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	43.00
Harwinton,	3.20	....	.50	....	.50	1.30	1.30	....	6.25	1.30	2.00	.60	1.30	5.75	18.15	42.15
Chester,	7.50	....	.80	....	....	3.85	....	.80	6.05	1.55	1.45	.45	.45	1.10	1.65	25.65
Horse hoe Park Agricultural Association,	.50	.25	.25	$0.25	.25	.50	.75	....	12.25	....	.25	.25	....	.25	17.25	33.00
Beacon Valley,	2.00	....	1.75	....	1.25	1.00	1.00	....	4.25	.75	1.50	.75	1.50	2.25	10.75	28.75
Orange,	22.25	.50	.75	....	.75	5.25	....	3.00	16.75	3.50	9.50	.75	5.75	8.60	102.15	180.50
Madison,	4.50	....	.50	....	....	....	....	....	3.00	1.00	1.00	....	....	1.25	10.95	22.20
Rockville Fair Ass'n,	6.25	1.00	2.00	1.50	2.00	19.00	1.50	....	68.75	1.75	2.25	.25	1.75	3.50	88.95	200.45
Guilford,	8.75	1.75	.75	....	....	.75	....	....	12.75	.55	1.25	....	....	2.00	22.65	51.20
New London County,	3.25	2.25	2.25	2.25	2.75	4.25	2.25	....	10.75	2.50	3.25	1.75	4.50	4.25	54.25	100.50
Conn. B. Keepers Ass'n,	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Colchester Grange Corp.	1.95	.25	.65	.25	.25	.55	....	....	1.60	.25	1.10	.25	.40	1.45	11.65	20.60
Conn. Dairymen's Association,	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Berlin and Conn. State Agricultural Society,	61.25	1.75	2.25	1.25	2.00	3.25	1.50	....	22.00	2.75	3.00	.75	2.25	4.25	18.50	126.75
Simsbury,	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	34.50
Granby,	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	11.50
Greenfield Country Cl'b,	6.90	....	.75	....	.75	9.50	.75	....	7.20	5.25	3.50	1.00	6.25	3.25	25.15	70.25
Woodstock,	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	75.60
Suffield,	78.00	....	.50	....	....	....	....	....	14.25	1.75	1.00	....	1.75	1.75	....	16.50
Wolcott,	6.00	1.25	1.00	....	1.00	3.00	....	....	9.25	1.25	1.00	.50	1.75	.75	8.50	35.25
Conn. Fair Ass'n,	115.25	.50	2.25	.50	5.50	29.50	3.50	....	172.25	18.50	16.00	3.50	29.25	29.50	....	422.00
Putnam Fair,	....	....	....	....	....	3.00	....	....	12.00	2.00	1.50	2.00	3.00	2.00	7.45	32.95
Windham County,	4.50	.75	.75	.75	.75	.75	.75	....	11.45	1.50	1.50	.75	1.00	7.75	48.50	81.45

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ANALYSIS OF PREMIUMS AND GRATUITIES PAID.—CONTINUED. FARM PRODUCTS AND MISCELLANEOUS.

SOCIETIES.	Fruits.	Flowers.	Other Cult. Crops.	Butter.	Cheese.	Honey and Wax.	Bread and Cake.	Sugar, Syrup, Preserved Fruit.	Total Farm Products.	Agricultural Implements.	Mechanical Inventions.	Fine Arts and Fancy Articles.	Decorated Carts and Trains of Oxen.	Plowing at Exhibition.	Grange Exhibit.	Medals.	Diplomas.	Total Miscellaneous.
Farmington Valley,	$20.40	$4.25	......	$2.00	......	......	$4.50	$10.50	$74.40	......	......	$30.75	......	......	......	......	......	$30.75
Union Agricultural Society of Barkhamsted, Colebrook and Hartland,	25.50	6.50	$9.75	......	$1.25	......	......	3.25	64.75	......	......	6.00	$10.00	......	......	......	......	16.00
Connecticut Pom. Society,	370.90	......	......	......	......	......	......	......	389.15	......	......	......	......	......	......	......	......	......
New London County Horticultural Society,	1.50	113.00	......	......	......	......	......	......	121.50	......	......	......	......	......	......	1	25	.25
Union,	11.00	3.25	12.00	1.00	......	......	2.55	......	45.30	......	......	19.30	......	......	$10.00	......	......	30.30
Stafford Springs,	59.00	6.00	79.75	1.00	......	......	6.05	......	151.80	......	$34.35	70.20	65.00	......	......	......	......	169.55
New Haven Co. Hort. Soc.,	24.00	728.95	......	......	......	......	......	......	......	......	......	......	......	......	......	1	4	......
Conn. Horticultural Soc.,	10.00	162.50	......	......	......	......	......	......	215.50	......	......	......	......	......	......	1	53	54.00
Harwinton,	16.50	5.60	......	.50	......	$1.30	4.50	2.85	81.25	......	17.80	9.85	57.00	......	......	......	......	84.65
Chester,	14.30	13.75	16.00	......	......	.50	6.45	17.40	94.05	$ .75	23.00	18.80	28.00	......	......	......	......	70.55
Horseshoe Park,	42.25	6.75	1.50	4.75	......	1.00	6.75	4.25	67.25	......	......	24.50	......	......	......	......	24	24.50
Beacon Valley,	32.75	10.25	......	.75	......	......	10.50	2.25	85.25	......	2.45	14.00	......	......	......	......	......	16.45
Orange,	81.25	5.50	......	......	......	1.50	9.00	......	277.25	......	......	66.25	......	......	......	......	......	66.25
Madison,	16.50	5.65	......	.50	......	.50	1.80	2.85	50.00	......	......	10.05	12.00	......	......	......	......	22.05
Rockville Fair Ass'n,	93.50	74.50	......	5.00	......	1.50	33.00	4.50	212.00	......	......	172.20	30.00	......	......	......	......	202.20
Guilford,	17.30	10.85	16.25	3.00	......	.25	1.00	4.05	103.90	......	......	47.25	85.75	......	......	......	......	133.00
New London County,	28.25	19.75	......	......	......	1.25	10.50	2.00	162.25	......	10.00	69.25	......	......	......	......	......	79.25
Conn. Bee Keepers Ass'n.,	......	......	......	......	......	379.00	......	......	379.00	......	......	......	......	......	......	......	......	......
Colchester Grange Corp.,	7.00	3.30	4.35	.75	......	2.75	7.20	3.50	49.45	......	......	24.20	3.25	......	......	......	......	27.45
Conn. Dairymen's Ass'n,	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Berlin and Conn. State Agricultural Society,	212.50	119.00	180.50	41.00	......	1.00	29.00	65.75	775.50	......	......	111.00	250.29	......	......	34	10	361.29
Simsbury,	......	......	......	......	......	......	......	......	34.50	......	......	......	......	......	......	......	......	......
Granby,	12.00	......	......	......	......	......	......	......	198.50	......	......	......	......	......	......	......	......	......
Greenfield Country Club,	78.20	31.50	......	.75	.75	2.75	14.00	9.00	207.20	......	......	191.35	25.00	......	......	......	46	216.35
Woodstock,	......	53.10	36.93	12.00	......	......	......	31.70	209.33	......	73.52	58.50	......	......	......	......	......	132.02
Suffield,	16.50	......	7.25	......	......	......	......	......	139.25	......	......	......	70.00	......	......	......	......	89.80
Wolcott,	16.75	.75	7.25	2.50	......	......	6.75	5.50	39.50	......	......	......	5.00	......	25.00	......	......	40.75
Conn. Fair Association,	381.25	123.50	283.00	......	......	76.50	37.75	16.75	1,520.75	......	103.00	211.75	......	......	......	......	1	314.75
Putnam Fair,	37.00	32.75	......	......	......	......	17.15	......	119.85	......	......	7.00	......	......	......	......	......	7.00
Windham County,	53.00	24.60	45.00	4.50	5.50	1.75	24.40	11.00	169.75	......	......	140.85	......	......	......	......	......	140.85

NUMBER OF ANIMALS EXHIBITED.—1909.

SOCIETIES.	Bulls.	Milch Cows.	Heifers.	Calves.	Oxen (pairs).	Steers (pairs).	Fat Cattle.	Horses.	Horses — speed.	Sheep.	Swine.	Poultry (coops).	All other Stock.
Farmington Valley,	12	22	8	7	8	8	....	12	....	....	....	....	....
Union Agricultural Soc. of Barkhamsted, Colebrook and Hartland,	3	5	7	4	6	8	....	18	....	25	....	12	....
Connecticut Pomological Society,	....	....	....	....	....	....	....	....	....	....	....	....	....
New London County Hort. Soc.,	....	....	....	....	....	....	....	....	....	....	....	....	....
Union,	6	15	2	10	5	1	....	8	11	6	1	16	5
Stafford Springs,	15	4	34	30	27	30	4	21	....	....	....	....	....
New Haven County Horticultural Society,	....	....	....	....	....	....	....	....	....	....	....	....	....
Connecticut Horticultural Society,	....	....	....	....	....	....	....	....	....	....	....	....	....
Harwinton,	8	12	1	4	37	23	2	18	....	14	11	94	40
Chester,	2	10	5	4	5	4	....	4	....	....	....	40	....
Horseshoe Park Agricultural Association,	18	42	40	20	80	10	4	21	....	13	14	....	....
Beacon Valley,	5	8	5	5	22	10	8	10	20	....	....	164	....
Orange,	18	64	24	11	65	5	6	29	....	3	7	71	15
Madison,	1	7	1	5	20	....	1	3	....	....	....	117	....
Rockville Fair Association,	28	109	39	28	32	19	6	19	....	25	8	456	....
Guilford,	2	19	2	10	....	....	....	21	....	....	25	100	....
New London County,	30	179	27	36	75	15	16	35	30	98	53	282	....
Connecticut Bee Keepers Ass'n,	....	....	....	....	....	....	....	....	....	....	....	....	....
Colchester Grange Corporation,	....	....	....	....	....	....	....	....	....	....	....	....	....
Connecticut Dairymen's Association,	....	....	....	....	....	....	....	....	....	....	....	....	....
Berlin and Conn. State Agri. Soc.,	39	56	41	31	70	14	5	69	....	66	10	320	....
Simsbury,	....	....	....	....	....	....	....	....	....	....	....	....	....
Granby,	....	....	....	....	....	....	....	....	....	....	....	....	....
Greenfield Hill Country Club,	10	12	10	5	57	....	6	....	....	7	4	270	....
Woodstock,	....	100	....	....	....	52	....	52	....	....	....	155	....
Suffield,	....	....	....	....	....	....	....	....	....	....	....	206	....
Wolcott,	17	44	8	15	35	15	8	17	....	2	3	150	....
Conn. Fair Ass'n,	51	95	42	66	....	....	....	117	69	150	107	2,850	....
Putnam,	....	....	....	....	....	....	....	....	....	....	....	....	....
Windham County,	17	46	54	22	45	50	....	24	....	43	2	17	....

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AGRICULTURAL FAIRS IN CONNECTICUT.—1909.

SOCIETIES.	PLACE.	DATE.	ATTENDANCE.						
			Monday.	Tuesday.	Wednesday.	Thursday	Friday.	Saturday.	Total.
Farmington Valley,	Collinsville,	Sept. 23–25,	....	....	....	900	500	500	1,900
Union Agricultural Society of Barkhamsted, Colebrook and Hartland	....	Oct. 12,	....	2,500	....	....	....	....	2,500
Conn. Pomological Society,	Berlin,	Sept. 14–17,	....	....	....	....	....	....	
New London County Hort. So.,	Norwich,	June 23, Sept. 23,	....	....	350	400	....	....	750
Union,	Broad Brook,	Sept. 15,	....	....	3,000	....	....	....	3,000
Stafford Springs,	Stafford Springs,	Sept. 29, 30, Oct. 1,	....	3,000	6,000	3,000	....	....	12,000
New Haven County Hort. Society,	New Haven,	Nov. 2–4,	....	350	400	430	....	....	1,180
Connecticut Horticultural Society,	Hartford,	Sept. 23, 24, Nov. 3, 4,	....	....	300	1,000	650	....	2,300
Harwinton,	Harwinton,	Oct. 5,	....	12,000	....	....	....	....	12,000
Chester,	Chester,	Sept. 15,	....	....	750	....	....	....	750
Horseshoe Park,	Willimantic,	Sept. 14–16,	....	1,000	7,000	2,000	....	....	10,000
Beacon Valley,	Naugatuck,	Oct. 12,	....	3,000	....	....	....	....	3,000
Orange,	Orange,	Sept. 6, 7,	5,350	1,000	....	....	....	....	6,350
Madison,	Madison,	Sept. 23,	....	....	....	1,500	....	....	1,500
Rockville Fair Association,	Rockville,	Sept. 21-23,	....	2,000	7,000	3,000	....	....	12,000
Guilford,	Guilford,	Sept. 29,	....	....	7,000	....	....	....	7,000
New London County	Norwich	Sept. 6–8,	8,000	7,000	15,000	....	....	....	16,500
Conn. Bee Keepers Ass'n.,	Charter Oak Park,	Sept. 6-11,	....	....	....	....	....	....	....
Colchester Grange Corporation,	Colchester,	Sept. 23, 24,	....	....	....	50	150	....	200
Conn. Dairymen's Ass'n.,	Hartford,	....	....	....	....	....	....	....	....
Berlin & Conn. State Agri. Soc.,	Berlin,	Sept. 14–17,	5,000	10,000	10,000	5,000	....	....	30,000
Simsbury,	Simsbury,	Sept. 29, 30,	....	....	....	....	....	....	....
Granby,	Granby,	Oct. 6, 7,	....	....	800	2,500	....	....	3,300
Greenfield Country Club,	Greenfield Hill,	Sept. 14–16,	....	896	2,251	1,409	....	....	4,556
Woodstock,	So. Woodstock,	Sept. 13–15,	....	3,380	1,020	....	....	....	4,400
Suffield,	Suffield,	Oct. 12–14,	....	2,100	7,800	500	....	....	10,400
Wolcott,	Wolcott,	Oct. 13,	....	....	2,500	....	....	....	2,500
Conn. Fair Association	Charter Oak Park,	Sept. 6–11,	....	....	....	....	....	....	....
Putnam Fair,	Putnam,	Aug. 31, Sept. 1, 2	....	300	3,000	1,052	....	....	4,352
Windham County,	Brooklyn,	Sept. 7–9,	....	....	3,000	1,000	....	....	4,000

OFFICIAL DIRECTORY

OF THE

CONNECTICUT PATRONS OF HUSBANDRY

FOR 1910.

OFFICERS OF CONNECTICUT STATE GRANGE.

Master, L. H. Healey, No. Woodstock.
Overseer, G. A. Vincent, Kent.
Lecturer, J. A. Sherwood, Easton.
Steward, Ard Welton, Plymouth.
Assistant Steward, W. S. Hine, Derby.
Chaplain, Rev. G. F. Goodenough, Northfield.
Treasurer, N. S. Platt, 395 Whalley ave., New Haven.
Secretary, H. E. Loomis, Glastonbury.
Gate-Keeper, F. M. Candee, Naugatuck.
Ceres, Mrs. A. L. Potter, Woodstock.
Pomona, Mrs. A. C. Hyde, Brooklyn.
Flora, Mrs. U. E. Avery, Ledyard.
Lady Steward, Miss E. C. Burch, Old Lyme.

Executive Committee.

O. S. Wood, Ellington, ...	Term	expires	1911
J. H. Hale, South Glastonbury, . .	"	"	1912
J. H. Blakeman, Oronoque, . . .	"	"	1913
L. H. Healey, North Woodstock, . .	"	"	1912
H. E. Loomis, Glastonbury, . . .	"	"	1912

Finance Committee.

G. Warren Davis, Norwich, M. L. Coleman, Seymour,
E. W. Biglow, Litchfield.

Woman's Work.

Mrs. D. A. St. John, New Canaan.

Past Masters' Association.

W. H. Barron, Danielson, F. E. Blakeman, Oronoque
E. J. Hempstead, New London.

TAXATION.

J. NORRIS BARNES, Yalesville, L. M. REED, Union,
G. C. BECKWITH, Nepaug.

GENERAL DEPUTIES.

O. S. WOOD, Ellington, B. C. PATTERSON, Torrington,
J. H. HALE, South Glasonbury.

SPECIAL DEPUTIES.

W. H. BARRON, Danielson, GEO. A. HOPSON, Wallingford.

DEPUTIES FOR POMONA GRANGES.

Central Pomona, No. 1,	CHARLES T. DAVIS, Middletown, ALLEN B. COOK, Farmington.
Quinebaug Pomona, No. 2,	C. B. POMEROY, JR., Willimantic.
East Central Pomona, No. 3,	H. D. SIKES, Suffield, C. W. BRADLEY, Rockville.
Mt. County Pomona, No. 4,	T. GOODENOUGH, Winchester.
New Haven County Pomona, No. 5.	W. H. BALDWIN, Cheshire.
New London County Pomona, No. 6,	C. E. STAPLES, Colchester.
Excelsior Pomona, No. 7,	W. L. PIERPON, Waterbury.
Seaview Pomona, No. 8,	E. B. LYNDE, Chester.
Fairfield County Pomona, No. 9,	F. E. BLAKEMAN, Oronoque.
Housatonic Valley Pomona, No. 10,	H. W. TREAT, Bridgewater.

BOARD OF ARBITRATION.

Executive Committee, Overseer and Lecturer.

PATRONS' MUTUAL FIRE INSURANCE COMPANY.

President, HENRY E. LOOMIS, Glastonbury.
Vive-President, J. ARTHUR SHERWOOD, Easton.
Treasurer, O. S. WOOD, Ellington.
Secretary, H. C. DUNHAM, Middletown.

EXECUTIVE COMMITTEE.

PRESIDENT, SECRETARY, W. H. CARRIER, Glastonbury,
G. A. VINCENT, Kent, ANDREW KINGSBURY, Rockville.

ANNUAL MEETING.

Wednesday after second Tuesday in January.

JUVENILE DEPUTIES.

P. B. LIBLEY, Danielson, MRS. NELLIE C. CLEVELAND, Hampton.

OFFICERS OF THE GRANGES.

NAME.		MASTER.	LECTURER.	SECRETARY.
CENTRAL POMONA.				
Central Pomona,	1,	**Charles T. Davis, Middletown,**	Mrs. L. W. Button, Rocky Hill,	J. H. Francis, Wallingford.
Quinebaug Pomona,	2,	**William H. Barron, Danielson,**	Charles A. Wheeler, Storrs,	Frank C. Lummis, Chaplin.
East Central Pomona,	3,	**Charles R. Risley, Silver Lane,**	Mrs. Kate Carrier, Glastonbury,	Mrs. Laura J. Brewer, Glastonbury.
Mountain Co. Pomona,	4,	**Karmi Kimberly, Torrington,**	Lillian R. Norton, Torrington,	Arthur B. Ferry, Winsted.
New Haven Co. Pomona,	5,	**Walter H. Baldwin, Cheshire,**	Frank N. Platt, Milford,	Flora E. Hough, Wallingford.
New London Co. Pomona,	6,	**Everett P. Barnes, R. F. D. 3, Norwich,**	G. Warren Davis, R. F. D. 3. Norwich,	Otto L. Pultz, Lebanon.
Excelsior Pomona,	7,	**Jerome A. Downs, Bethany,**	Mrs. Mabel F. Griswold, Waterbury,	Mrs. Martha E. Judd, Southbury.
Sea View Pomona,	8,	**George B. Hall, Moodus,**	Mrs. Katie F. Jewett, Lyme,	D. Eugene Smith, Madison.
Fairfield Co. Pomona,	9,	**Olin C. S. Shelton, Shelton,**	Mrs. Edith W. Mitchell, Newtown,	Mrs. Nellie E. Blakeman, Oronoque.
Housatonic Valley Pomona,	10,	**James S. Chaffee, Amenia, N. Y.,**	E. J. Chaffee, Amenia Union, N. Y.,	F. S. Peet, Kent.
SUBORDINATE GRANGES.				
Washington,	11,	Frederic J. Ford, Washington Depot,	Richard E. Dodge, Washington,	C. W. McIlravey, Washington Depot.
Tunxis,	13,	Walter M. Brown, Bloomfield,	Mrs. Annie M. Woodford, Bloomfield,	George Kellogg Marvin, Bloomfield.
Hope,	20,	Herbert R. Leach, Litchfield,	William L. Benton, Torrington,	Mrs. Alice E. Loomis, Torrington.
Lebanon,	21,	F. N. Taylor, Lebanon,	L. E. Livermore, Lebanon,	Mrs. Mercy E. Fuller, Lebanon.
Cheshire,	23,	William T. Peters, Cheshire,	Mrs. Mabel A. French, Cheshire,	Frederick Doolittle, Cheshire.
Berlin,	24,	George B. Carter, Berlin,	Mrs. Grace Ventress, Berlin,	W. H. Shumway, Berlin.
Union,	25,	F. W. Prill, Plantsville,	Mrs. Bertha A. Heller, Southington,	A. S. Chaffee, Southington.
Glastonbury,	26,	Frank Dixon, So. Glastonbury,	Mrs. Ida Lee Hale, So. Glastonbury,	Miss Lucy E. Miller, So. Glastonbury.
Suffield,	27,	Arthur Sikes, Suffield,	George A. Austin, Suffield,	Mrs. E. F. Newton, Agawam, Mass.
Meriden,	29,	Minor Ives, So. Meriden,	Mrs. Mary J. Ives, So. Meriden,	Mrs. Mabel A. Francis, Wallingford.
Wapping,	30,	Julius Bratsnyder, Buckland,	W. W. Grant, Buckland,	Mrs. Annie Collins, Wapping.
Manchester,	31,	Arthur E. Loomis, So. Manchester,	Mrs. J. C. Thompson, So. Manchester,	Keeney B. Loomis, So. Manchester.
No. Cornwall,	32,	H. W. Andrews, Cornwall,	Benjamin Sedgwick, Falls Village,	Mrs. Adele P. Brush, West Cornwall.
Wallingford,	33,	J. Norris Barnes, Yalesville,	Mrs. Lillian Prisk, Yalesville,	Miss Flora E. Hough, Wallingford.
Cawasa,	34,	Oliver Case, Collinsville,	John Crowley, Collinsville,	Mrs. Annette E. Case, Canton.
No. Haven,	35,	Myron Brockett, No. Haven,	Herbert Carlson, No. Haven,	Mrs. Ezra G. Munson, No. Haven.
Little River,	36,	Ruben E. Pearle, Hampton,	Mrs. Mary W. Jewett, Hampton,	Mrs. A. M. Burnham, Hampton.
East Hartford,	37,	Robert A. Hall, East Hartford,	Charles R. Risley, Silver Lane,	Miss Charlotte C. Smart, Silver Lane.
New Canaan,	38,	Stephen Heath, New Canaan,	Miss B. L. Wakeman, New Canaan,	Leon C. Tooker, New Canaan.
Burritt,	39,	Albert W. Vibberts, New Britain,	Mrs. Edith Horsfall, New Britain,	Mrs. F. H. Sharpe, New Britain.
Senexet,	40,	William C. Child, Woodstock,	Chauncey S. Child, Woodstock,	Florence P. Wilcox, Woodstock.
Konomoc,	41,	J. Frank Rogers, Waterford,	Mrs. H. Hanney, Waterford,	Leon A. Forsyth, Waterford.
Mattabessett,	42,	Herbert L. Dow, Middletown,	Mrs. E. M. Congdon, Middletown,	Leonard B. Markham, Middletown.
Brooklyn,	43,	Addie C. Hyde, Brooklyn,	Raymond Stone, Brooklyn,	Fred H. Lawton, Brooklyn.
Newington,	44,	E. O. Crawford, New Britain,	Henry Fields, Newington,	Thomas A. Francis, Newington.

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OFFICERS OF THE GRANGES.—CONTINUED.

NAME.	MASTER.	LECTURER.	SECRETARY.
SUBORDINATE GRANGES — *Cont.*			
Harwinton, 45,	C. B. Strong, Torrington,	Miss Gladys Rogers, Torrington,	Miss Eveline S. Barker, Torrington.
Ellington, 46,	Frank B. Nangle, Rockville,	Mrs. Mary K. Holton, Ellington,	John J. Oates, Rockville.
Bolton, 47,	William C. White, Bolton,	J. Wesson Phelps, Bolton,	Miss Adelia N. Loomis, Bolton.
Whigville, 48,	Edwin Matthews, Bristol,	Mrs. Cecilia Wilcox, Bristol,	Mrs. Agnes L. Hanna, Bristol.
Farmington, 49,	Allen B. Cook, Farmington,	Mrs. A. J. Birdseye, Farmington,	Miss Grace McKenney, Farmington.
Westfield, 50,	Elihu H. Plum, Middletown,	Mrs. Lucy Gilbert, Middletown,	Mrs. Minnie C. Payne, Middletown.
Tolland, 51,	David A. Brown, Tolland,	Mrs. C. H. West, Rockville,	James H. Clough, W. Willington.
Vernon, 52,	Irving Campbell, Vernon,	Miss Emma Blankenburg, Rockville,	Miss Ethel Skinner, Rockville.
Plainville, 54,	Percy A. Cowles, Plainville,	Mrs. Mary P. Williams, Southington,	Miss Florence A. Cowles, Plainville.
Stafford, 55,	John M. Larned, Stafford Springs,	Mrs. Ethel C. Plumb, Stafford Springs,	Miss Mabelle E. Edson, Stafford.
East Haddam, 56,	Edwin W. Crocker, Moodus,	Robert W. Bingham, East Haddam,	S. E. Williams, Colchester.
Durham, 57,	C. W. Coe, Northford,	Frank E. Korn, Durham,	Miss Ruth M. Tucker, Durham.
West Hartford, 58,	Frederic E. Duffy, West Hartford,	Mrs. M. J. Burnham, West Hartford,	George B. Thayer, West Hartford.
Saybrook, 59,	John S. Dickinson, Saybrook,	Mrs. Marion Chalker, Saybrook,	Mrs. Ida H. McAllister, Saybrook.
Wolf Den, 61,	Newell A. Badger, Abington,	Mrs. Fannie M. Fuller, Abington,	Miss E. G. Grosvenor, Abington.
Eureka, 62,	Gustavus C. Beckwith, New Hartford,	Mrs. Anna Atwood, New Hartford,	Mrs. M. V. Douglass, Collinsville.
Middlefield, 63,	Frederick Winter, Jr., Rockfall,	Miss Bertha R. Camp, Middlefield,	Bertha A. Burnham, Middlefield.
Mansfield, 64,	E. B. Fitts, Storrs,	C. J. Grant, Storrs,	C. A. Wheeler, Storrs.
Quinnatissett, 65,	Everett E. Rhodes, Thompson,	Miss Mary J. Rose, Putnam,	Miss Sybil Pettis, Thompson.
Killingworth, 66,	Herbert C. Stevens, Clinton,	Mrs. Hattie M. Davis, Clinton,	Lovel D. Parmelee, Clinton.
Cromwell, 67,	Mrs. Ellen Jewell, Cromwell,	John F. Chalmers, Cromwell,	Miss Lottie M. Sage, Cromwell.
Natchaug, 68,	Don C. Hattin, Mansfield Center,	Clarence E. Chester, Chaplin,	Frank C. Lummis, Chaplin.
Shetucket, 69,	Luther B. Ashley, Hampton,	Mrs. Eva Kimball, Hampton,	C. Perry Simpson, Willimantic.
Canterbury, 70,	Hart W. Goff, South Canterbury,	Rev. Geo. W. Clark, Canterbury,	Levi N. Clark, South Canterbury.
Mad River, 71,	James R. Murdock, Waterbury,	George Clyne, Waterbury,	Mrs. Anna H. Pierpont, Waterbury.
Plymouth, 72,	Richard W. Myers, Terryville,	Miss Marion Skilton, Terryville,	Miss Edith E. Sutliffe, Plymouth.
Indian River, 73,	Albert N. Beard, Milford,	Dr. A. L. Tuttle, Milford,	George S. Clark, Milford.
Winchester, 74,	Arthur B. Johnson, Winsted,	Mrs. Bessie M. Bronson, Winchester,	Miss G. L. Goodenough, Winchester.
Coventry, 75,	H. B. Pomeroy, Rockville,	Andrew Kingsbury, Rockville,	Miss Elsa E. Hall, Rockville.
Andover, 76,	Henry G. Phelps, Andover,	Walter F. Ladd, Andover,	Mrs. Aurilla M. Snow, Andover.
Clinton, 77,	Howard L. Chittenden, Clinton,	Mrs. Mary J. Brooks, Clinton,	Wm. H. Kelsey, 2d, Clinton.
Colchester, 78,	M. R. Abell, Colchester,	Frank E. Foote, Colchester,	C. E. Staples, Colchester.
Housatonic, 79,	Wm. I. Lobdell, Stratford,	Miss Evelena Ferry, Stratford,	Miss Alice M. Wilcoxson, Stratford.
Colebrook, 82,	James W. R. Allen, Winsted,	Henry Vining, Winsted,	Mrs. S. E. Northrop, Colebrook.
Totoket, 83,	Elon H. Rose, Branford,	Walter S. Watrous, Branford,	Mrs. Alice B. Miller, Branford.
Foxon, 84,	Ellsworth Thompson, East Haven,	Mrs. Honora E. Granniss, E. Haven,	Mrs. Sarah E. Bailey, East Haven.
Wangumbaug, 85,	F. A. Spaulding, South Coventry,	Miss Mary Green, South Coventry,	Miss Helen Potter, Willimantic.

OFFICERS OF THE GRANGES.—Continued.

Name.		Master.	Lecturer.	Secretary.
Subordinate Granges.—*Cont.*				
Webutuck,	86,	Edw. K. Dean, Amenia Union, N. Y.,	Mrs. H. E. Northrop, Amenia U'n, N.Y.	Mrs. F. R. Randall, Amenia U'n, N.Y.
Hillstown,	87,	Harry J. Brewer, Glastonbury,	Chas. G. Strickland, So. Manchester,	Frederick W. Schaefer, Glastonbury.
Ekonk,	89,	Charles Barber, Moosup,	John Tanner, Moosup,	Mrs. Lottie S. Gallup, Moosup.
Ashford,	90,	Alex M. Bassett, Warrenville,	Frank H. Bennette, Ashford,	Mrs. Addie S. Bassett, Warrenville.
Seymour,	91,	Luther G. Coburn, Seymour,	Miss Mary Hull, Seymour,	Mrs. Emma E. Francis, Seymour.
Harmony,	92,	Louis B. Beardsley, Stepney Depot,	John M. Burr, Stepney Depot,	William J. Nichols, Stepney Depot.
Border,	93,	Clifford L. Clinton, South Windham,		Mrs. Lillian M. French, Willimantic.
East Windsor,	94,	F. M. Thompson, Warehouse Point,	Lemuel Stoughton, Warehouse Point,	J. S. Allen, East Windsor.
Pachaug,	96,	Willis C. Terry, Norwich,	William P. Holmes, Griswold,	William A. Edmond, Griswold.
Putnam,	97,	Horace F. Wilder, Putnam,	Andrew J. Kennedy, Putnam,	Mrs. Ella W. Wood, Putnam.
Taghhannuck,	100,	Mrs. A. C. Buckley, Amenia, N. Y.,	Miss Bessie Prindle, Sharon,	Mrs. Ella B. St. John, Sharon.
Mashapaug Lake,	101,	L. M. Reed, Stafford Springs,	Nancy Howard, West Woodstock,	H. R. Howard, Stafford Springs.
Beacon Valley,	103,	D. A. Doolittle, Westville,	Mrs. Clara Benson, Naugatuck,	F. M. Candee, Naugatuck.
Somers,	105,	Clifford J. Parsons, Somers,	Mrs. Geo. F. Kibbe, Somers,	Mrs. C. W. W. Pease, Somers.
Litchfield,	107,	Geo. F. Sanford, Litchfield,	Geo. H. Hunt, Litchfield,	F. L. Tharp, Litchfield.
Woodbridge,	108,	Charles A. Bond, Westville,	homas F. S. Bartlett, Westville,	Leroy C. Beecher, Westville.
East Hampton,	109,	Henry Z. Royce, East Hampton,	Mrs. Eva Johnson, East Hampton,	Mrs. Ola West, East Hampton.
Preston City,	110,	Erva L. Barnes, Norwich,	Mrs. Erva L. Barnes, Norwich,	N. H. Hall, Norwich.
Hebron,	111,	Carrol W. Hutchinson, Gilead,	Rev. J. G. W. Herald, Gilead,	Martha Buell, Andover.
Killingly,	112,	Mrs. Carrie M. Day, Danielson,	Frank Bennett, Attawaugan,	P. B. Sibley, Danielson.
Highland,	113,	J. B. Tillinghast, South Killingly,	Mrs. Mabel Phillips, South Killingly,	A. A. Tillinghast, South Killingly.
Wethersfield,	114,	S. Wayne Adams, Hartford,	J. Stanley Welles, Wethersfield,	J. Elmer Bannon, Wethersfield.
Rocky Hill,	115,	Frederick H. Bacon, Rocky Hill,	Carrie L. Picard, Rocky Hill,	Winfield D. Honiss, Rocky Hill.
Bristol,	116,	Milo Leon Norton, Bristol,	Mrs. Susie Burr, Bristol,	Mary C. A. Perkins, Bristol.
Unity,	117,	Chas. R. Marvin, Deep River,	Mrs. Arabella Beebe, Deep River,	Mrs. Helen L. Stevens, Deep River.
Beacon,	118,	Charles S. Nearing, Northfield,	Mrs. Mary M. Hopkins, Thomaston,	Robert A. Goodwin, Litchfield.
Morris,	119,	Joel W. Skilton, Thomaston,	Charles H. Twing, East Morris,	William F. Kirchberger, Thomaston.
Bethlehem,	121,	Albert E. Johnson, Bethlehem,	Miss Hattie Hill, Bethlehem,	Miss Elsie A. Lake, Watertown.
Watertown,	122,	A. F. Copeland, Thomaston,	Mrs. Elizabeth Abbott, Watertown,	Miss Mary Wright, Watertown.
Westbrook,	123,	Horace E. Kelsey, Westbrook,	Miss Edna Stannard, Westbrook,	David C. Dibble, Westbrook.
Higganum,	124,	W. W. Clark, Higganum,	Miss Ethel C. Burr, Higganum,	M. G. Skinner, Higganum.
Hollenbeck,	125,	Walter I. Kellogg, Falls Village,	Mrs. I. Shultis, Falls Village,	Miles L. Blodgett, Falls Village.
Pleasant Valley,	126,	Oscar Lathrop, Woodbury,	Miss Louise Curtiss, Woodbury,	Arthur N. Skilton, Woodbury.
Goodwill,	127,	Ansel E. Bidwell, Glastonbury,	Mrs. Bertha D. Bidwell, Glastonbury,	Harold B. Waldo, Glastonbury.
Orange,	128,	Edward H. Newell, Orange,	Arthur S. Crosby, Orange,	Miss Bessie P. Otis, Orange.
Pohtatuck,	129,	John J. Northrop, Newtown,	Allison P. Smith, Newtown,	Miss Hattie M. Northrop, Newtown.
Farmill River,	130,	D. P. Loverin, Shelton,	Miss Mary E. MacDonald, Shelton,	Mrs. E. C. Wooster, Shelton.

OFFICERS OF THE GRANGES.— CONCLUDED.

NAME		MASTER	LECTURER.	SECRETARY.
SUBORDINATE GRANGES.— *Cont.*				
Columbia,	131,	George H. Champlin, Leonard's Br.,	William P. Johnson, Columbia,	Miss Amelia J. Fuller, Columbia.
Wichita,	132,	Frank Volsard, New Preston,	Fred P. Johnson, Cornwall Bridge,	Miss Amy M. Hoffman, Cornwall Br.
Greenfield Hill,	133,	Clarence H. Banks, Fairfield,	Miss Olive A. Pease. Fairfield,	D. Frank Brown, Fairfield.
Trumbull,	134,	Dwight M. Fuller, Long Hill,	Mrs. Jennie Brinsmade, Trumbull,	Mrs. Ella Rogers, Bridgeport.
Silver Lake.	135,	Arthur W. Lamb, Sharon,	Miss Emeline Palmer, Sharon,	Miss Evelyn D. Scott, Sharon Valley.
East Canaan.	136,	Jarvis C. Stevens, Canaan,	Miss Minnie E. Briggs. East Canaan,	Miss Clara M. Bottum, East Canaan.
North Stonington,	138,	E. Frank White, North Stonington,	Mrs. Edna H. Tryon, No. Stonington,	John L. York, North Stonington.
Middlebury,	139,	John Carragon, Middlebury,	Miss Edith V. Beeman, Waterbury,	Albert W. Buell, Middlebury.
Plainfield,	140,	P. W. Lewis, Plainfield,	Mrs Edith M. Kennerdy, Moosup,	Harold Lewis, Plainfield.
Rock Rimmon,	142,	S. E. Cook, Beacon Falls,	C. B. Clark, Beacon Falls,	Mrs. Ella Roberts, Beacon Falls.
Goshen,	143,	Harry H. North, Goshen,	Charles Peck, Goshen,	Mrs Edith Cook, Goshen.
Prospect,	144,	William Bottomley, Naugatuck,	Mrs. Mabel Griswold, Waterbury,	Miss Florence Bottomley, Naugatuck.
Rippowam,	145,	Cyrus Sarles, Springdale,	Arthur I. Crandall, Stamford,	Mrs. Minnie Birdsall, Springdale.
Norfield,	146,	Clarence Shipman, Norwalk,	Anna Hurlbutt, Westport,	Harry L. Waterbury, Norwalk.
Lyme,	147,	Ray L. Harding, Lyme,	Mrs. Katie F. Jewett, North Lyme,	Mrs. Ellen H. Palmer, Lyme
Easton,	149,	Clarence A. Jennings, Bridgeport,	Florence C. Marsh, Bridgeport,	Willard S. Gillette, Long Hill.
Woodstock,	150,	Samuel N. Brett, North Woodstock,	Miss Maud Healey, North Woodstock,	Charles M. Perrin, North Woodstock.
Enfield,	151,	Walter E. Price, Warehouse Point,	Olin S. Olmsted, Hazardville,	Mrs. Ellen L. Killam, Thompsonville.
Cannon,	152,	Henry Cooke, Georgetown,	Mrs. Arthur Little, Cannon Station,	Nelson S. Hurlbutt, Cannon Station.
Bridgewater,	153,	William M. Curtis, New Milford,	Mrs. Mary B. Welton, Bridgewater,	Allen H. Treat, Bridgewater.
Kent,	154,	Frank S. Peet, Kent,	Mrs. Annie B. Peet, Kent,	Chas. F. Kirke, Kent.
Danbury,	156,	Edward S. Baldwin, Danbury,	Charles R. Curtis, Danbury,	Mrs. Jessie D. Ryder, Danbury.
East Lyme,	157,	Earle Morgan, East Lyme,	Mrs. Myra Morgan, East Lyme,	Roy Kelly, East Lyme.
Chester,	158,	G. Myron Abbey, Chester,	Mrs. Hattie G. Smith, Chester,	W. P. Holden, Chester.
Salisbury,	159,	Hezekiah Goodwin, Falls Village,	Mrs. Mary J. Reed, Salisbury,	Wm. E. Pettee, Salisbury.
Aspetuck Valley,	160,	George N. Abbott, New Milford,	Anna M. Hendrix, New Milford,	William R. Benedict, Northville.
Bozrah,	161,	E. Judson Miner, Fitchville,	Miss Alice A. Bishop, Norwich,	Mrs. Charles J. Abell, Norwich.
Old Lyme,	162,	George Griswold, Lyme,	Thomas Brown, Black Hall,	Miss Maysie Scollon, Lyme
Redding,	163,	Louie C. Rumsey, Redding Ridge,	Albert A. Gorham, Redding Ridge,	Mrs. Olivia Sanford, Redding Ridge.
Bethel,	164,	James E. Gallagher, Bethel,	Harold S. Davis, Bethel,	Willis B. Judd, Bethel.
Ridgefield,	165,	Caro H. Northrop, Ridgefield,	Mrs. Helen Bowles, Ridgefield,	Arthur W. Northrop, Ridgefield.
Salem,	166,	Benj. W. Jenkins, Colchester,	Mrs. Mary A. Darling, Colchester,	H. A. Rathbun, Colchester.
Ledyard,	167,	William I. Allyn, Mystic.	Mrs. Lizzie Colver, Groton,	Mrs. Fannie L. Clark, Norwich.
Stonington,	168,	Arthur G. Wheeler, Stonington,	Albert T. Mitten, Stonington,	Mrs. Josie A. Wheeler, Stonington.
Riverton,	169,	Wm. L. Parsons, Riverton,	Carlton S. Roberts, Riverton,	Miss Ruth Rowley, Riverton.
Wemanesa,	170,	Charles H. Evans, Gaylordsville,	Miss Bessie Soule, Gaylordsville,	Josie M. Hungerford, Gaylordsville.
Mystic,	171,	Jesse B. Stinson, Mystic,	Miss Lizzie F. Wilcox, Mystic,	Miss Bessie W. Heath, Mystic.
Norwich,	172,	Andrew B. Davies, Norwich,	Mrs. Maud E. Bliss, Norwich,	Mrs. Nettie B. Fanning, Norwich.
Wolcott,	173,	Wilfred V. Warner, Waterbury,	Mrs. Bessie Woodin, Waterbury,	Mrs. Mary E. Coe, Waterbury.
Torringford,	174,	Edson G. Davis, Torrington,	Mrs. Edith S. Many, Torrington,	Mrs. Emeline B. Hopkins, Torrington.
Lake Valley,	175,	Nelson T. Hungerford,	Mrs. Maud Giddings,	Mamie E. Gray, Sherman.
Groton.	176.	Irving E. Crouch Groton.	Miss Amanda Allen, Groton.	Charles L. Gates, Groton.

REPORT OF THE TREASURER.

Chas. A. Thompson *in account with*

State Board of Agriculture.

1908.			Dr.	Cr.
July	1.	Balance amount in treasury,	$180.65	
"	15.	Wilson H. Lee,		$11.00
Aug.	5.	J. M. Trueman,		1.95
Sept.	14.	Chas. F. Roberts,		100.00
Nov.	7.	Wilson H. Lee,		46.50
"	"	B. C. Patterson,		30.96
"	24.	Ed. Halladay,		44.96
"	28.	Case, Lockwood & Brainard Co.,		44.65
Dec.	8.	To railroad fares,		100.00
"	10.	Mrs. Ida G. Moulton,		15.50
"	"	I. C. Fanton,		31.50
"	11.	J. H. Bowker & Co.,		25.00
"	"	James F. Brown,		5.75
"	12.	D. Walter Patten,		14.90
"	"	Winthrop Hotel,		157.10
"	"	W. C. Knipper,		46.00
"	"	W. H. A. Maynard,		5.00
"	"	W. E. Britton,		11.85
"	18.	Jas. E. Wing,		93.25
"	"	Dr. C. D. Smead,		79.90
"	"	E. P. Mayo,		42.50
"	"	Wilson H. Lee,		2.80
"	"	H. C. Morrison,		43.64
"	19.	By State appropriation,	1,500.00	
"	"	H. N. Loomis,		13.80
"	"	Durham Press,		6.75
"	"	L. H. Healey,		21.54
"	"	The Blatchley Co.,		15.00
"	"	L. A. Clinton,		3.60
"	"	Railroad fares,		19.73
"	23.	Meriden Morning Record,		18.00
"	"	Journal Publishing Co.,		6.00
"	"	The Penny Press,		12.00
"	"	Chronicle Printing Co.,		5.50

1909.				
Jan.	9.	James F. Brown,		711.25
“	“	I. C. Fanton,		17.80
“	12.	State appropriation,	500.00	
“	“	James F. Brown,		4.50
“	“	Seaman Mead,		11.20
“	“	Hartford Times,		13.44
“	“	J. B. Palmer,		22.90
“	“	Chas. A. Thompson,		40.75
“	“	D. S. Kelsey,		11.35
“	14.	N. H. Brewer,		15.00
“	“	W. P. Johnson,		10.00
“	“	Chas. E. Chapman,		5.00
“	“	O. R. Driggs,		10.00
“	“	E. E. Burnell,		5.00
“	“	S. R. Bronson,		2.50
“	“	Chas. S. Phelps,		10.00
“	“	W. L. Davis,		17.68
“	“	The Tribune,		5.00
“	“	New Britain Record,		3.00
“	“	Weekly Gazette,		8.00
“	“	Northampton Valley Pub. Co.,		3.00
“	“	D. W. Patten,		4.50
“	“	H. L. Garrigus,		2.60
“	“	Bristol Press Pub. Co.,		5.00
“	“	Chas. F. Bushnell,		1.50
“	“	A. F. Hawes,		3.95
“	29.	J. M. Trueman,		8.80
Feb.	3.	Windsor Locks Journal,		3.50
“	“	Shore Line Times,		12.00
April	17.	Wilson H. Lee,		7.10
“	“	F. H. Stoneburn,		2.75
“	“	Journal Publishing Co.,		18.00
“	“	C. D. Jarvis,		5.40
“	“	Mrs. C. A. Wheeler,		7.10
“	“	H. L. Hamilton,		9.35
“	“	F. H. Stadtmueller,		15.03
“	“	J. B. Stewart,		1.60
“	“	D. W. Patten,		4.50
“	22.	J. M. Trueman,		11.30
“	“	E. H. Jenkins,		10.75
“	“	L. H. Healey,		17.29
“	“	W. E. Britton,		3.65
“	“	F. H. Stadtmueller,		5.61
“	“	J. B. Palmer,		14.10
May	3.	Windham County Observer,		4.00
“	18.	Maud K. Wheeler,		6.95

June	14.	B. C. Patterson,		24.50
"	"	L. A. Clinton,		11.65
"	"	F. H. Stoneburn,		10.65
"	"	Geo. H. Lamson, Jr.,		3.64
"	"	Mrs. C. A. Wheeler,		2.50
"	19.	Dr. E. H. Jenkins,		7.50
"	"	E. E. Brown,		31.95
"	"	State appropriation,	1,000.00	
"	20.	Ed. Halladay,		34.65
"	29.	Thos. L. Brown,		5.00
"	30.	Seaman Mead,		15.30
"	"	D. W. Patten,		16.30
"	"	Chas. A. Thompson,		45.29
"	"	J. B. Palmer,		20.35
"	"	James F. Brown,		693.80
"	"	L. H. Healey,		21.14
"	"	I. C. Fanton,		50.75
		Deficit,	4.65	
			$3,185.30	$3,185.30

Above accounts found correct and approved July 1, 1909.

J. B. Palmer, }
D. W. Patten, } *Auditors.*
Geo. A. Barnes, }

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State of Connecticut.

PUBLIC DOCUMENT NO. 34.

BIENNIAL REPORT

OF THE

STORRS

Agricultural Experiment Station,

STORRS, CONN.

FOR THE YEARS 1907-8 1908-9.

Printed By Order Of The Legislature.

13

ROCKVILLE, CONN.
T. F. RADY & CO., PRINTING.

PUBLICATION
APPROVED BY
THE BOARD OF CONTROL.

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BOARD OF CONTROL

THE BOARD OF TRUSTEES
—OF THE—
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Charles Thom,	*Appointed by Station Staff*
F. H. Stoneburn,	*Appointed by Station Staff*

STATION STAFF

L. A. Clinton, M.S.	*Director*
J. M. Trueman, B.S.Agr.	*Dairy Husbandman*
F. H. Stoneburn,	*Poultryman*
W. M. Esten, M.S.,	*Bacteriologist*
C. D. Jarvis, Ph. D.	*Horticulturist*
Charles Thom, Ph.D.	*Cheese Expert, Mycologist*
Arthur W. Dox, Ph.D.	*Cheese Expert, Chemist*
G. H. Lamson, M.S.,	*Economic Zoologist*
C. J. Grant, B.S.A.	*Cheese Maker*
H. D. Edmond, B.S	*Chemist*
Christie J. Mason, B.Agr.	*Assistant Bacteriologist*
Grace E. Seage,	*Assistant in Bacteriology*

Publications of the Station

AVAILABLE FOR FREE DISTRIBUTION

The following publications of the Storrs Agricultural Experiment Station are available for distribution, and, so long as the supply lasts, will be sent free to residents of Connecticut who desire them.

BULLETINS.

No. 14. The Elm Leaf Beetle.
No. 25. The Covered Pail a Factor in Sanitary Milk Protion.
No. 28. Dairy Observations.
No. 29. Records of a Dairy Herd for Five Years.
No. 30. Spraying Notes for 1903.
No. 31. Food Value of a Pound of Milk Solids.
No. 32. Protecting Cows From Flies.
No. 34. Discussion of the Amount of Protein Required in the Ration for Dairy Cows.
No. 35. The Camembert Type of Soft Cheese in the United States.
No. 37. The So-Called "Germicidal Property" of Milk.
No. 38. The Marketing of Poultry Products.
No. 39. Pig Feeding Experiments.
No. 40. Creamery Problems.
No. 41. Spraying Notes, 1904-1905.
No. 42. Quality of Milk Affected by Common Dairy Practices.
No. 43. The Facility of Digestion of Foods a Factor in Feeding.
No. 44. Poultry Observations.
No. 45. The Apple Leaf Miner.
No. 46. Directions for Making the Camembert Type of Cheese.
No. 47. Milking Machines.
No. 48. Comparative Studies with Covered Milk Pails.
No. 49. Petroleum Emulsion for the San Jose Scale.
No. 51. Sources of Bacteria in Milk.
No. 54. Proprietary and Home-made Miscible Oils for the control of the San Jose Scale.
No. 55. Infection and Preservation of Eggs.
No. 56. Control of Insects and of Plant Diseases.
No. 57. A Study of Some Connecticut Dairy Herds.
No. 58. Camembert Cheese Problems in United States.

REPORTS.

The Reports of the Storrs Agricultural Experiment Station for 1889, '90, '94 '95 (Part III.), '96 (Part III.), '98, '99, 1900, 1901, 1905, 1906, 1907, 1908 and 1909 are available for free distribution.

Address all requests to the Director of Storrs Agricultural Experiment Station, Storrs, Conn.

Report of the Treasurer

For the Fiscal Year Ending June 30th, 1908.

The following summary of receipts and expenditures, made out in accordance with the form recommended by the United States Department of Agriculture, includes, first, the Government appropriation of $7,500, and, secondly, the government appropriation of $4,500.00 and the annual appropriation of $1,800 made by the State of Connecticut, together with various supplemental receipts. These accounts have been duly audited according to law, as is shown by the Auditor's certificates, copies of which are appended.

GOVERNMENT APPROPRIATION—RECEIPTS AND EXPENDITURES.

Receipts.

United States Treasury	$7,500 00

Expenditures.

Salaries	$5,700 05
Labor	943 39
Postage and stationery	122 55
Freight and express	2 85
Heat, light, water, and power	38 44
Chemical supplies	56 78
Seeds, plants, and sundry supplies	172 86
Fertilizers	12 00
Feeding Stuffs	17 20
Library	56 34
Tools, implements and machinery	16 82
Furniture and fixtures	201 00
Scientific apparatus	9 00
Live stock	93
Traveling expenses	118 27
Contingent expenses	15 00
Buildings and land	16 52
	$7,500 00

Auditor's Certificate.

I, the undersigned, duly appointed Auditor of the Corporation, do hereby certify that I have examined the books and accounts of the Storrs Agricultural Experiment Station for the fiscal year ending June 30, 1908, that I have found the same well kept and classified as above, and that the receipts for the year from the Treasurer of the United States are shown to have been $7,500 and the corresponding disbursements $7,500, for all of which proper vouchers are on file and have been examined by me and found correct, thus leaving no balance.

And I further certify that the expenditures have been solely for the purposes set forth in the act of Congress approved March 2, 1887.

(Signed) L. J. Storrs, Auditor.

Storrs, Conn., July 15, 1908.

ADAMS APPROPRIATION—RECEIPTS AND EXPENDITURES

Receipts.

United States Treasury	$4,500 00

Expenditures.

Salaries	$2,691 60
Labor	196 08
Postage and stationery	26 20
Chemical supplies	328 74
Seeds, plants, and sundry supplies	543 24
Library	70 59
Tools, implements and machinery	10 80
Furniture and fixtures	35 00
Scientific apparatus	502 00
Traveling expenses	34 55
Building and land	1 20
	$4,500 00

Auditor's Certificate.

I, the undersigned, duly appointed Auditor of the Corporation, do hereby certify that I have examined the books and accounts of the Storrs Agricultural Experiment Station for the fiscal year ending June 30, 1908, that I have found the same well kept and classified as above, and that the receipts for the year from the Treasurer of the United States are shown to have been $4,500, and the corresponding disbursements $4,500, for all of which proper vouchers are on file and have been examined by me and found correct, thus leaving no balance.

And I further certify that the expenditures have been solely for the purposes set forth in the act of Congress, approved March 16, 1906.

(Signed) L. J. Storrs, Auditor.

Storrs, Conn., July 15, 1908.

STATE APPROPRIATION AND SUPPLEMENTAL RECEIPTS RECEIPTS AND EXPENDITURES

Receipts.

State of Connecticut	$1,951 09
Miscellaneous receipts	610 61
	$2,561 70

Expenditures.

Salaries	$17 66
Labor	146 54
Publications	225 55
Postage and stationery	72 26
Freight and express	116 13
Heat, light, water, and power	145 18
Chemical supplies	136 46
Seeds, plants ,and sundry supplies	261 10
Fertilizers	5 25
Feeding stuffs	322 06

Library	68 98
Tools, implements and machinery	58 18
Furniture and fixtures	50 30
Scientific apparatus	22 00
Live stock	166 46
Traveling expenses	253 65
Contingent	13 00
Building and repairs	475 37
Balance	5 57
	$2,561 70

Auditor's Certificate.

I, the undersigned, duly appointed Auditor of the Corporation, do hereby certify that I have examined the books and accounts of the Storrs Agricultural Experiment Station for the fiscal year ending June 30, 1908, that I have found the same well kept and classified as above, and that the receipts for the year from the State of Connecticut are shown to have been $1,951.09, and the receipts from miscellaneous sources, $610.61, making the total receipts from the State and miscellaneous sources $2,561.70. The corresponding disbursements were $2,556.13, for all of which proper vouchers are on file and have been by me examined and found to be correct, thus leaving a balance of $5.57.

(Signed) L. J. Storrs, Auditor.

Storrs, Conn., July 15, 1908.

D. W. Patten, Treasurer.

Report of the Treasurer

For the Fiscal Year Ending June 30th, 1909.

The following summary of receipts and expenditures, made out in accordance with the form recommended by the United Seates Department of Agriculture, includes, first, the Government appropriation of $7,500, and, secondly, the Government appropriation of $4,500.00 and the annual appropriation of $1,800 made by the State of of Connecticut, together with various supplemental receipts. These accounts have been duly audited according to law, as is shown by the Auditor's certificates, copies of which are appended.

GOVERNMENT APPROPRIATION—RECEIPTS AND EXPENDITURES.

Receipts.

United States Treasury	$7,500 00

Expenditures.

Salaries	$5,275 87
Labor	1,897 68
Publications	4 30
Postage and stationery	24 35
Seeds, plants, and sundry supplies	6 00
Tools, implements and machinery	13 86
Furniture and fixtures	12 42
Scientific apparatus	16 45
Traveling expenses	214 07
Contingent expenses	15 00
Buildings and land	20 00
	$7,500 00

Auditor's Certificate.

I, the undersigned, duly appointed Auditor of the Corporation, do hereby certify that I have examined the books and accounts of the Storrs Agricultural Experiment Station for the fiscal year ending June 30, 1909, that I have found the same well kept and classified as above, and that the receipts for the year from the Treasurer of the United States are shown to have been $7,500 and the corresponding disbursements $7,500, for all of which proper vouchers are on file and have been examined by me and found correct, thus leaving no balance.

And I further certify that the expenditures have been solely for the purposes set forth in the act of Congress approved March 2, 1887.

(Signed) L. J. Storrs, Auditor.

Storrs, Conn., July 15, 1909.

ADAMS APPROPRIATION—RECEIPTS AND EXPENDITURES

Receipts.

United States Treasury	$5,500 00

Expenditures.

Salaries	$3,352 92
Labor	500 95
Postage and stationery	24 19
Freight and express	24 91
Heat, light, and power	197 43
Chemical supplies	261 13
Seeds, plants, and sundry supplies	553 20
Fertilizers	44 26
Library	50 10
Tools, implements and machinery	71 95
Furniture and fixtures	28 96
Scientfic apparatus	155 11
Traveling expenses	24 98
Buildings and repairs	209 91
	$5,500 00

Auditor's Certificate.

I, the undersigned, duly appointed Auditor of the Corporation, do hereby certify that I have examined the books and accounts of the Storrs Agricultural Experiment Station for the fiscal year ending June 30, 1909, that I have found the same well kept and classified as above, and that the receipts for the year from the Treasurer of the United States are shown to have been $5,500 and the corresponding disbursements $5,500, for all of which proper vouchers are on file and have been examined by me and found correct, thus leaving no balance.

And I further certify that the expenditures have been solely for the purposes set forth in the act of Congress approved March 16, 1906.

(Signed) L. J. Storrs, Auditor.

Storrs, Conn., July 15, 1909.

STATE APPROPRIATION AND SUPPLEMENTAL RECEIPTS. RECEIPTS AND EXPENDITURES.

Receipts.

State of Connecticut	$1,801 18
Miscellanous receipts	648 06

Expenditures.

Labor	$ 453 20
Publications	29 06
Postage and stationery	308 13
Freight and express	168 04
Heat, light, water and power	134 16
Chemical supplies	88 75
Seeds, plants and sundry supplies	154 42
Fertilizers	53 60
Feeding Stuffs	433 48
Library	33 00
Tools, implements and machinery	74 32
Furniture and fixtures	56 11

Live Stock	34 50
Traveling expenses	184 66
Contingent	74 55
Buildings and repairs	87 50
Balance	81 76
	$2,449 24

I, the undersigned, duly appointed Auditor of the Corporation, do hereby certify that I have examined the books and accounts of the Storrs Agricultural Experiment Station for the fiscal year ending June 30, 1909, that I have found the same well kept and classified as above, and that the receipts for the year from the State of Connecticut are shown to have been $1,801.18, and the receipts from miscellaneous sources $648.06, making the total receipts for the State and miscellaneous sources $2,449.24. The corresponding disbursements were $2,367.48, for all of which proper vouchers are on file and have been by me examined and found to be correct, thus leaving a balance of $81.76.

(Signed) L. J. Storrs, Auditor.

Storrs, Conn., July 15, 1909.

D. W. Patten, Treasurer.

Report of the Director.

By act of the legislature the reports of the Experiment Station are now issued biennially instead of annually as heretofore. This is the first biennial report of the station, taking the place of the twentieth and twenty-first annual reports.

CHANGES IN THE STATION STAFF.

But few changes have been made in the station staff during the past two years.

Professor C. K. Graham resigned his position as Poultry Husbandman, and Professor F. H. Stoneburn was appointed to fill the vacancy. Professor Stoneburn was formerly connected with the college and station in the same capacity and his return to us insures the success of the work in the poultry department.

Mr. F. R. Thompson resigned his position as cheese maker and Mr. Clinton J. Grant was appointed to the position. Mr. Grant is a graduate of the Connecticut Agricultural College and of Cornell University and by training is well prepared for the difficult problems encountered in this work.

Mr. H. L. Garrigus formerly assistant field experimenter now devotes his entire time to his college duties as farm superintendent.

One new department of station work has been added, i. e., Economic Zoology, with Professor George H. Lamson in charge.

The return of the former head of the Dairy Department, Professor C. L. Beach, as President of the College insures a continuance of satisfactory relations between college and station.

PUBLICATIONS.

During the past two years the following bulletins have been issued:

No. 49. Petroleum Emulsion for the San Jose Scale.
No. 50. Squab Investigations.
No. 51. Sources of Bacteria in Milk.
No. 52. Poultry Culture.
No. 53. Improving Dairy Conditions.
No. 54. Proprietary and Home-made Miscible Oils for the Control of the San Jose Scale.
No. 55. Infection and Preservation of Eggs.
No. 56. Control of Insects and Plant Diseases.
No. 57. A Study of Some Connecticut Dairy Herds.
No. 58. Camembert Cheese Problems in the United States.

These bulletins are issued in editions of 10,000 copies each, with 2,500 extra copies for binding with the report of the station. The demand for these bulletins has been so great that some of them were out of print shortly after being issued. One firm in Boston had printed at its own expense 3,500 copies of Bulletin No. 51, "Sources of Bacteria in Milk." These copies were for distribution to dairymen producing milk for the Boston market.

Unless we can have the bulletins printed in larger editions it will soon be necessary to limit the number of copies sent out of the State.

FINANCES.

While the Storrs Experiment Station is a department of the Connecticut Agricultural College it is maintained entirely by special funds separate from the college funds. The college provides laboratories, heat and water for the same without charge to the station. All employes engaged entirely in work for the station are paid their entire salaries from station funds. Employes engaged in both college and station work receive pay from both according to the amount of time devoted to each. The station is at present bearing its full share of the salaries of the men employed. The report of the Treasurer on page V. shows the entire amount of receipts and expenditures during the past two years. The receipts from the United States Appropriations for the past year were as follows:

Hatch Fund	$7,500.00
Adams Fund	5,500.00
Total from United States	$13,000.00
State Appropriation	$1,800.00

From the above statement it will be seen that the State of Connecticut does but little towards maintaining the Experiment Station. As a result the work of the station must be strictly confined to those lines of research which are permissible under the Federal regulations. We are not permitted to co-operate with the farmers in what is called "extension work," for the Federal funds cannot be used for this purpose.

CO-OPERATION WITH THE U. S. DEPARTMENT OF AGRICULTURE.

In co-operation with the Dairy Division of the Bureau of Animal Husbandry, U. S. Department of Agriculture, the cheese investigations have been continued. A bulletin has been recently published bringing the results of the work with Camembert cheese up to date. Roquefort cheese problems are being studied at the present time. While considerable progress has been made, the results have not been published. The results already secured have attracted wide attention and this station has become known as the centre for information concerning problems of soft cheese manufacture.

During the past year, Mr. A. W. Dox, Chemist, has been granted a leave of absence and has conducted special research work on enzyme action under the direction of Dr. Mendel of Yale. As a result of the work Mr. Dox has been granted the degree of Doctor of Philosophy. Dr. Dox has now resumed his work with us and will continue his special investigations upon enzyme action in the ripening of soft cheese. All of our relations with the Department of Agriculture have been harmonious and satisfactory.

STATION EQUIPMENT.

Upon completion of the new greenhouses by the college, the old greenhouse was turned over to the Experiment Station. At an expense of about three hundred dollars this was repaired and has proven a valuable addition to the station equipment. Under the immediate supervision of Dr. C. D. Jarvis experiments in plant breeding have been conducted under the most favorable conditions.

The laboratories for work in dairy bacteriology and mycology are thoroughly well equipped. Two laboratories for chemical work have been fitted and furnished. In one of these the chemical work of the cheese investigation is conducted, while in the other are made the regular chemical analyses for the station.

NEEDS OF THE STATION.

There is great need for an experiment station building in which shall be provided the various laboratories for station work. At present these laboratories are widely scattered and in some cases rooms are occupied which are needed for college work. The small building now used as a directors office is entirely inadequate to this purpose. There is no room for storing publications, no place for a station library and reading room, and no place suitable as a mailing room for bulletins and reports. The funds received from the Federal Government can be used only for conducting experiments, not in providing buildings and land, as it is expected the State will provide these.

No orchards of any kind are available at the college for experiment work. In past years we have conducted experiments in various orchards of the state. But this is unsatisfactory as it is impossible to give close inspection to the work that is needed. Some provision should be made for land on which experimental orchards can be located.

The report of the various departments follow. These reports show the lines of work which are now in progress, and interesting and valuable results should be secured. All members of the station staff have done faithful work, the President of the college and the Board of Trustees have given assistance in every way possible.

L. A. CLINTON.

Report of Dairy Husbandman.

To the Director of the Storrs Agricultural Experiment Station:

Sir:—The work of the past year has consisted largely of investigations with dairy cattle. Studies in breeding, feeding, and care of cows, and in testing for milk and butter-fat productions have been carried on continually.

The work has been divided as follows:

1. Studies with the herd of the Connecticut Agricultural College.
   (a). Mature cows.
   (b). Young stock.
2. Studies with five herds owned on private farms.
3. Tests for advanced registry; supervision for the various Breeders' Associations.

1. The College herd has furnished opportunity for careful study:—

a. On the effect of different rations on the condition of the cows and their yield of milk. The younger cows in the herd, twenty in number, were divided into two lots. One lot has been fed a narrow ration containing a large amount of protein. The other lot has been fed a wide ration with correspondingly low protein. This experiment is to be continued for some length of time, in order to note the effect of wide and narrow rations on the vigor, fertility, and productiveness of the animals. The experiment has not been under way long enough at the present time to warrant us in drawing any conclusions.

The work is important as it is becoming increasingly difficult to secure good cows. One of the serious problems confronting the modern dairyman is failure of his cows to produce offspring regularly. Infertility and abortion are common among the best herds. Any light that can be thrown on these problems will be welcome. The care and feeding of the cows, undoubtedly is important in this connection and careful records will be kept covering a series of years in order to determine if possible their relation to the problem.

The kind and amount of feed given a cow has much to do with her bodily vigor and productiveness at the pail. It is possible to produce a heavy milk yield by the feeding of rich stimulating nitrogenous food. The result of such feeding for a series of years is a disputed question. An effort is being made to determine the effect of heavy nitrogenous feeding on a number of cows for a number of years and also the effect upon their offspring for several generations. The opposite experiment is being made on another group of cows; that is the use of a low protein ration.

b. Records of the cost of feeding and caring for calves and yearlings are being carefully kept in order to determine the cost of raising cows. Practically all heifer calves born are being raised in order to determine what percentage will turn out to be profitable cows. The results obtained will not establish any principle for other herds, but it will be of value to know what even one herd will do under careful management.

2. The work with the five private herds consisted of a study of their production for one year. About 200 cows were owned in the five herds. The experiment station sent a man to visit each herd two days in each month. This "Supervisor" weighed and sampled the milk from each cow for the four milkings while he was at the farm. His weights were used as a check on the owner's weight for the whole month, and his fat test was taken as the average fat content for the month. In this way very accurate data were obtained concerning the production of the cows in these herds. It was found that they varied greatly in their value as milk producers. The work demonstrated clearly the great need for a careful study of the dairy herds in Connecticut. One entire herd was kept at a loss for the whole year, while in the other cases the whole herds made a profit, but individual cows in the herd were not profitable. The results of this work are published in detail in Bulletin 57. The station would be glad to continue this work and test a great many herds in the various sections of the

state. The visit of the Supervisor to each farm each month gives the owner an opportunity to discuss questions concerning the management of his herd, and gives the experiment station a chance to help in the solution of the problems that confront each dairyman. This work is extremely important and should be kept up but we have been obliged to discontinue it on account of lack of funds.

3. The work of supervising advanced registry tests for the associations of pure bred cattle has been continued as usual. Tests have been made for the Holstein-Freisian Association, the Ayrshire Association and the American Jersey Cattle Club.

Bulletin 53, on "Improving Dairy Conditions" was published during the year. This bulletin discussed the cost of feeding calves and yearlings in the College herd, the improvement of dairy barns and the production of clean milk.

J. M. TRUEMAN.

Report of Poultry Husbandman.

To the Director of the Storrs Agricultural Experiment Station:

Sir:— As my second appointment as a member of your staff dates from September 15th, 1908, I can only submit a report of the work of this department from that date.

Upon my arrival here I found that there were no unfinished poultry experiments, so it was necessary to make a fresh start. A knowledge of the performance of the various individuals in the breeding pens seemed desirable as a basis of future experimental work, and all buildings containing breeding birds were accordingly equipped with trap nests. Beginning January 1, 1909, we have accurate records of the egg production of practically all breeders. Data of interest and value have been accumulated, which are helping us in our work along other lines. Several of the fowls have made excellent records, and from them we have a nice flock of chicks.

Arrangements have been made with Dr. Leo F. Rettger, Department of Bacteriology and Hygiene, Yale, to conduct a joint investigation of the cause, prevention and cure of the disease of chicks commonly termed "white diarrhea." For some years Dr. Rettger has been at work upon the first part of the problem, and this Station is to be congratulated upon being able to secure the benefit of his pioneer work in this line. The disease causes untold loss to poultrymen annually, and in my opinion the investigation now under way is the most important ever undertaken by the poultry department of this Station.

During the past few months we have carried on certain lines of cross breeding with a definite purpose in view. The results have been quite satisfactory to date. A full report of this work will be submitted later.

The lines of work outlined above, together with some preliminary experiments in feeding and management of laying hens, will be carried on during the coming year.

Respectfully submitted,

F. H. STONEBURN.

Report of Cheese Investigation 1908-09.

To the Director of the Storrs Agricultural Experiment Station:

Sir:—The work of the cheese investigation has been divided about equally between the Roquefort and the Camembert types of cheese during the past year. Progress was delayed somewhat by the resignation of Mr. F. R. Thomson, November 1, 1908. Before leaving, Mr. Thomson's notes were gone over as fully as possible with him and the outlines of a paper upon Camembert cheese were written. After his retirement the work was continued by Mr. Grant and myself. During the winter we were able to carry the work far enough to finish a paper covering most of the important points which had come to light since the publication of previous papers, in such a way as we think will answer many of the inquiries which are constantly being made upon such questions. Some questions remain, however, for further investigation.

Among the topics discussed in this paper are the following:

1. Equipment and methods. In describing the equipment of Camembert cheese factories and methods of work in them, every effort was made to bring the practices recommended into harmony with the practical experiences of men who have run these factories. Where divergences are needed the reasons for such variation have been discussed fully and agreed upon as far as possible with the men having factory experience in making this kind of cheese.

2. The results of chemical analyses made in the last five years were brought together to show as clearly as possible the proper standards for composition in Camembert cheese and the relation of such standards to the composition of milk. In general, this review of results agreed with the well-established practice, that with the better grades of milk and even with the average

factory milk, the removal of a small part of the fat bringing the percentage relation of protein to fat somewhat higher, produces better flavors and textures than when whole milk is used

3. Methods were sought to control the gassy fermentation which at some seasons causes much difficulty in Camembert. Accumulated observation in experimental work, in the market, and in the factories operated in New York state, showed that this trouble has been much more prevalent in the cold months of winter than at other seasons, and that during part of this time, at least in our work, the normal lactic forms were either few in number or failed to produce acidity rapidly enough to prevent trouble. The purely bacteriological questions remain for further study. The practical problem of control within the limits of acidity found best for making this cheese (0-20-24% acidity) was solved by the production of pure starter from boiled milk, its introduction in minimum amounts—less than 1%, and the use of a long ripening period—preferably over night, at a temperature varying with conditions but in general below 57° F., in some cases below 50° F. In the course of our visit to one factory operated by an experienced French maker, Mr. Grant observed essentially this same method in use but often failing on account of more or less impurity in the starter itself, as we had seen from the cheeses made and sold by that factory.

4. The continued study of the relation of temperature and relative humidity to the ripening of this cheese led to the gathering and comparison of the data as to mean temperatures and means of relative humidity for working regions in this country and in France. This study showed that the extremes of temperature and the generally lower percentage of relative humidity in the larger part of the United States were sufficiently great to account for a large part of the failures experienced by those who had invested capital in these factories. These data were brought together and taken for discussion to certain of the men practically interested as investors and managers. The correctness of the conclusion was finally concurred in by all those consulted. This discussion results, therefore, in the following alternative: 1. The industry must be abandoned except

where nature has furnished the conditions; or, 2. In building factories, provision must be made to produce those conditions in spite of climatic conditions in the locality. This can be accomplished either by insulating the rooms at present in use, and by better control of ventilation, or by building new rooms partly or completely below ground and installing such systems of ventilation as will ensure the conditions wanted.

5. At her own request, suggestions for Camembert cheese-making upon the farm were made to Mrs. W. S. Dodd at East Corinth, Vermont. Although a single case, the work she has done has shown the possibility of making a fair grade of Camembert for use in the home or even for the local and personal market without serious expense of money or more time than is often spent in getting equivalent results from other work commonly done upon the farm. Whether others may eventually follow up the same line of work is at present not determined.

The paper presented has covered as fully as the data at hand would permit the questions which had been under investigation and especially those which had come up in correspondence with those endeavoring to operate factories. Although some questions remain, we think the paper will give substantially accurate information to those contemplating establishing factories, which will be equally valuable if it deters some men from investing hastily or assists others in obtaining satisfactory return from such work.

In reference to Camembert, we have several questions still open, such as (a) the relations of the bacteria and yeasts found in the slime upon the surface of the cheese, to the results; (b) the further study of the relation of seasonal conditions to the activity of the lactic species of bacteria (c) the rate of evaporation of water from Camembert cheeses of differing percentages of water content as determining the causes of shrinkage and the exact percentage relation between relative humidity, water content and the proper ripening of the cheese; (d) the continuation along with the study of the same problem in Roquefort and other cheeses, of the study of the relation of percentage of water and fat in cheese to the biology of the ripening processes. There appears to be a succession of organisms whose activities are determined by the percentage and perhaps also by the chemical or physical nature of the curd masses containing the water. The study has both very practical and real scientific interest.

In studying the Roquefort type of cheese, there are many difficulties. The practice of the French makers is very indefinitely described. They use sheep's milk as the basis for their work with or without admixtures of cow's milk. This gives them about twice the total solids of cow's milk. The percentage relation of protein and fat in sheep's milk is different from that in cow's milk. This calls for standardization of cow's milk before the same composition can be obtained. Even so, the specific chemical differences in the constituents of sheep's milk probably affect the final result. The process used in making French Roquefort has therefore to be adapted to cow's milk. This involves study of the ideals of composition and texture as represented by the excellent Roquefort purchasable in our markets. After such standards are approximately determined, making-practices must be devised to produce these results. As in other types of cheese, closely similar cheeses can be produced by methods varying greatly in detail. It becomes necessary therefore to test a long series of methods of manipulation, following each over a period sufficiently long to obtain its optimum results and to ripen the product under one or more sets of conditions. This puts three months as a minimum time in which any proposition can produce results for examination and usually a longer time is needed before the value of an idea can be judged safely. Working in this way during the past two years, cheeses have been produced which compared very favorably with the ideal in many particulars. So close has been the correspondence in texture and flavor with the imported Roquefort, that we feel entirely justified in believing that continued experiment will enable us to describe a process which will give satisfactory results. None of these cheeses has however entirely satisfied the requirements, some have lacked in flavor, others in texture, others have been too perishable—due to too high water content when ripe. The experience gained in this time has been used in determining the working limits within which practical methods must be found. Some of these are already well-defined. We have not however been willing to offer processes for publication because we are not yet satisfied as to which line of work will give the best final results.

In purely mycological lines less progress has been made during this year than previous years because so much time has been needed for consideration of purely cheese questions. Cultural work has been continued upon the species of molds occurring in this and related lines of work. The physiological relations of these various species to cheese and other food products call for much investigation which is greatly aided here because it can be carried parallel with Dr. A. W. Dox's chemical studies of particular forms. Each of us therefore is able to aid in the interpretation of the data obtained by the other. We are thus able to get results together which neither of us could obtain separately. During the coming year, the species of Penicillium as yet not fully described will be further studied, comparative cultures of large numbers of species will be made, largely in co-operation with Dr. Dox to determine how far data resulting from the study of single species are applicable to the whole group of related forms. It seems desirable also to extend the cultural work to species of other genera commonly found in our work, especially to Aspergillus.

Dr. Dox's review of his chemical studies follows:

"During nine months of the past fiscal year, the chemist was on leave of absence while pursuing investigations in the Laboratory of Physiological Chemistry at Yale University. The work carried on there was in the main a continuation of studies on the chemical and physiological properties of Penicillium camemberti—the fungus which is the chief factor in the ripening of Camembert cheese.

As was shown in a previous publication, the mold growing on the surface of the cheese secretes enzymes which diffuse into the curd mass and produce the chemical changes which constitute the ripening of the cheese. These enzymes which function outside the cell wall of the organism are known as extracellular enzymes, while those present inside the cells are called intracellular enzymes. It is to these intracellular enzymes that the writer's attention has been devoted. The results of the work are set forth in the following summary:—

When P. Camemberti is cultivated on a medium containing sucrose as the only source of carbon, and sodium nitrate as the only source of nitrogen, a considerable number of enzymes are produced. They are retained for the most part by the mycelium until the time of fructification. By treating the mycelium with acetone and ether, a dry powder results which contains the enzymes in such form that they retain their activity indefinitely.

The powder prepared in this way was found to contain the following enzymes: erepsin, nuclease, amidase, lipase, emulsin, amylase, inulase, ruffinase, sucrase, maltase and lactase. The lipase, inulase and lactase were however, quite feeble when the organism was grown on the cane sugar medium.

The protease behaves exactly like Cohnheim's erepsin, except that its activity is greatest in neutral media or media faintly acid with acid phosphates. It digests casein, gelatin and proteoses (Witte peptone), yielding a large percentage of amino acids, but does not attack native proteins to any appreciable extent.

The formation of erepsin is independent of the presence of protein or protein derivatives in the culture medium. An active erepsin is obtained when the organism is cultivated on a solution containing cane-sugar and sodium nitrate as the only source of carbon and nitrogen.

A nuclease, liberating purines and phosphoric acid from yeast nucleic acid, is obtained independently of the presence of nucleic acid or organic nitrogen compounds in the culture fluid.

An amidase, or perhaps group of amidases, is present which liberates ammonia from urea, asparagine, benzamide and alanine.

An enzyme decomposing hippuric acid into benzoic acid and glycocoll is present in a very active form.

The carbohydrate-splitting enzymes, amylase, inulase, raffinase, sucrase, maltase and lactase, are formed no matter which of the corresponding carbohydrates has served as the source of carbon in the culture medium. The amount of enzymes, which in some cases is quite small may be materially increased by cultivating the organism on the corresponding carbohydrate. This is particularly true of inulase, amylase and lactase, which ordinarily occur only in very small amount.

There is no evidence that enzymes not normally formed by the organism in demonstrable quantities can be developed by special methods of nutrition. The influence of adding a particular substratum to the medium is therefore to stimulate the production of the corresponding enzyme, which is normally formed under all conditions: not to develop an entirely new enzyme.

For the coming year additional experiments have been planned along similar lines to show the effect of the mold under various conditions upon butter fat. The flavor and texture of the cheese are dependent to some extent upon the amount of fat present. Although the greater part of the fat remains unchanged and can be recovered as such, it is not improbable that some of the substances that go to make up the characteristic flavor have their origin in the fat. This will be determined by cultural experiments.

Other experiments, to be conducted in co-operation with the mycologist, are designed to determine the effect of nutrition upon the production of color by certain fungi, and the influence of various gases upon the growth of the organisms. The latter work will have a direct bearing upon the Roquefort problem. Gases other than those of the air are undoubtedly occluded in the crevices in which the mold grows in Roquefort cheese, and must have some influence upon the nature of the organism and the rate of its development.

When more data are obtained, the results at hand will be brought together and their significance as regards cheese ripening will be pointed out more fully."

The experiments outlined represent a tentative review of some of the questions upon which beginnings have already been made. We plan to continue work upon as many of these points as circumstances permit.

Respectfully submitted,
CHARLES THOM, *Mycologist,*
A. W. DOX, *Chemist.*

Report of the Horticulturist.

To the Director of the Storrs Agricultural Experiment Station:

Sir:—The work of this department for the biennial period of 1908-9 has been continued along much the same lines as outlined in my last report and may be discussed under three heads:

I. WORK UNDER THE ADAMS FUND.

The work under this head embraces investigations pertaining to problems in heredity. There is now being grown on the station grounds, all obtainable varieties of beans and muskmelons from which to select types for breeding purposes. Some of the subjects that are being studied are as follows: technique, correlation of characters, allelomorphism, dominance of characters, and reversion. Much of my attention thus far has been given to the study of specific, varietal, and individual types and to the technique of hybridization. At the same time a great many hybrids of beans between individuals of known parentage have been obtained. Careful notes have been and are being taken regarding the behavior of these hybrids, but no definite results can be recorded at this time.

II. WORK UNDER THE HATCH FUND.

Under this head is considered experimental work of a more popular nature, or that type of investigation which aims to solve the immediate problems that confront the fruit-grower or vegetable-gardener.

The following brief outline of such work includes the investigations that have been concluded during the past biennial period and those that are still under way:

(a). *The control of the San Jose Scale.* Since the scale has become so prevalent in our eastern orchards there has been a constant demand for a convenient and efficient remedy. The commercial orchardists welcomed the introduction of the lime-sulphur wash, but the growers with areas too small to warrant the equipment of elaborate cooking plants were not satisfied. The growers with old apple orchards, also, complained of the inefficiency of the sulphur wash in controlling the scale. A commercial substitute, known as miscible or "soluble" oil, appeared on the market and, except for its costliness, seemed to meet the requirements. The success following its use induced the writer to investigate its composition with a view of discovering a method of home manufacture. Bulletin No. 49, (pages 5-12 of this report) records the result of such investigation.

As a result of such publication, various brands of miscible oil have appeared on the market and may be purchased at prices forty to fifty per cent. lower than the older well-known brands. In order to test these new remedies and compare them with the older and higher-priced brands, extensive orchard experiments were conducted in various parts of the state. Nine commercial brands and the home-made miscible oil were used in the test. Bulletin No. 54 (pages 169-197) records the results of these experiments and throws some additional light upon the home-manufacture of miscible oil.

(b) *The control of melon and cucumber blight.* Spraying experiments for the control of the blight (Plasmopara cubensis) of cucurbits were started in 1903 and continued for three years by Mr. E. R. Bennett. The work was taken up by the writer in 1906 and continued for the years 1907 and 1908. The investigations thus far have been chiefly on the influence of Bordeaux mixture on controlling the disease. The conclusions from these experiments may be briefly stated as follows:—

1. Bordeaux mixture will not completely control the disease, but will check its development sufficiently to permit the maturing of the crop.

2. Bordeaux mixture has an injurious effect upon the foliage and flowers, and in seasons of little or no blight, decreases the yield of fruit.

3. The results of six years' experiments show that even though Bordeaux mixture has an injurious effect upon the plant, it pays

to spray melons and cucumbers every year as a safeguard against disease.

4. Half-strength Bordeaux (2-2-50) gives as good results in controlling the disease as the full-strength mixture and its injurious effect is less pronounced.

During the coming season several other fungicides will be used in the experiment.

(c). *Control of bean anthracnose.* Spraying experiments extending over a period of three years has demonstrated the fact that bean anthracnose may be controlled by repeated and thorough sprayings of Bordeaux mixture. The foliage must be kept completely covered with the mixture from the first week in July till the maturing of the fruit. The spray must be directed by hand so as to cover the stems and both sides of the leaves. The ordinary potato sprayer is not suited to the purpose, for it is impossible to do thorough spraying in this way.

(d). *Testing new varieties.* In order to supply information regarding vegetable "novelties" the more important introductions are tested as they appear from year to year. Many of the so-called novelties that are pictured in glowing colors in the seed catalogue are nothing more than some old variety with a new name, or a name with a few high-sounding descriptives attached to it.

III. EXTENSION WORK.

Although there is a great need in Connecticut for work of an extension or demonstration character there are no funds available for the purpose and my efforts along this line necessarily have been restricted to an occasional lecture at field meetings, farmers' institutes, and regular grange meetings, for which there is no expense to the Experiment Station, and to correspondence pertaining to various subjects. Addresses have been delivered in various parts of the state on the following topics:

1. Suggestions for the Revival of the Apple Industry in New England.
2. Orchard Management.
3. The Control of the San Jose Scale.
4. Plant-breeding for Farmers.

5. The Farm Home.
6. Agricultural Education.

The correspondence of this department, in response to requests for information, is constantly increasing. It is gratifying to note that the general public are coming in closer contact with the experiment station and are availing themselves of the opportunity for direct information along definite lines. At the same time this correspondence, which essentially is a type of extention work, entails a great deal of time that might be devoted to research work. It has been the task of the Horticulturist to answer inquiries not only along horticultural lines but those pertaining to insects and diseases. With a view of relieving this pressure Bulletin 56, "The Control of Insects and of Plant Diseases" has been prepared.

I take this opportunity of calling your attention to the great need of funds for demonstration work in orcharding. The New England hills are exceptionally well adapted to apple growing. Here we have good soil, ideal climate, and the best markets near at hand. The western growers gained possession of the eastern markets largely by their superior methods of growing fruit. The best authorities agree in their belief that by adopting the most approved methods, New England may regain possession of the eastern apple market. What is needed more than anything else are a few illustration orchards to demonstrate the possibilities of our New England hill-sides in producing fruit of good appearance and of high quality. Undoubtedly many farmers would be willing to take care of a small orchard on their respective farms and follow the directions of an expert representative of the Experiment Station. Such a plan would call for a very small appropriation from the State, for the only expense incurred would be for the purchase of nursery stock and the travelling expenses of an inspector. The other New England states have appropriations that may be used for this purpose and some of them are contemplating the establishment of demonstration orchards on a similar plan to that suggested above.

Respectfully submitted,

C. D. JARVIS.

Report of Economic Zoologist.

To the Director of the Storrs Agricultural Experiment Station:

Sir:—My work this year has been to begin investigations to determine the effect carbon dioxide has upon the normal growth and development of the chick embryo, for this question is being asked by those who operate incubators and seems to be one of the vital questions on the subject of artificial incubation. It is hoped that this study will give some light on the conditions that effect the vitality of the chick and be of practical value to those who are interested in raising poultry.

Some work has also been done in Economic Entomology, and the subject of the susceptibility of certain varieties of plants to insect attack is receiving the greatest amount of time in this subject.

The first part of the year was mainly given to the study of the relation of bacteria to the preservation of the egg. Methods of infection of eggs were noted and "water glass" was recommended to be used as a preservative for those who would preserve eggs. This suggestion of the use of "water glass" is by no means a new or patent one, for "water glass" has been used successfully for a number of years. It was made that it might be more generally used and with the hope that more people might avail themselves of the opportunity of practicing a sensible form of economy. The main fact we wished to bring out was that the condition of the eggs to be preserved was of almost as much importance as the preservative used. This work was concluded with the publication of Bulletin No. 55.

Respectfully submitted,

Geo. H. Lamson, Jr.

Report of Chemist.

To the Director of the Storrs Agricultural Experiment Station:

Sir:—The work of the Department of Chemistry for the past two years has been confined to the general analytical work required by the various departments of the Experiment Station, cheese investigations, analyses for the referees of the Association of Official Agricultural Chemists and a special investigation in the liming of soil.

Dr. A. W. Dox, whose report appears elsewhere, has charge of the cheese work. During the past winter, while Dr. Dox was on a leave of absence, it became necessary for the writer to make many analyses of cheese.

The analytical work required by the various departments included the analysis of feeding stuffs, dairy products, soil, and air. In a small laboratory with limited facilities and no assistants it has been impossible to do a large amount of work.

The liming experiment was started in the spring of 1907 with nine plots of 1-20th of an acre. The experiments were planned to be carried on for a series of years and are not yet completed. The results of the work will be published later.

Another line of work just started is the determination of the quantity of CO^2 given off from eggs while hatching and the effect of various amounts on the vitality of the chicken before and after hatching. Work on the amount of CO^2 in incubators and under sitting hens was published in the report of the Station for 1907. The present experiments are a continuation of that work and required the construction of special apparatus to control the amount of air admitted and taken from the incubator in which the eggs are placed.

The work for the Association of Official Agricultural Chemists is of value in trying out new methods of work which may become official if proved of value by a large number of chemists working on the same samples. The work taken up by this department includes dairy products and insecticides.

Respectfully submitted,

H. D. Edmond.

Report of Dairy Bacteriologist.

To the Director of the Storrs Agricultural Experiment Station:

Sir:—Two years of investigation on the source of Bacterium lactis acidi have been completed. The investigation has been a difficult one, requiring a large amount of work, time and thought. We feel that our efforts have been met with a measure of success and hope that the results obtained will prove to be substantiated by other investigators. The importance of this organism in the dairy industry, justifies the use of time and money spent in the effort to determine its source. A bulletin is ready for publication discussing the organism and its sources.

On March 2nd, of this year was completed a year's work on the bacterial content of the milk of each cow of the College Herd. These tests were made from one milking, night or morning's milk, at intervals of about fourteen days, from Feb. 28th, 1908 to March 2nd, 1909. The large amount of data is nearly arranged and with the completion of the charts the subject matter will be ready for composition. A good many important minor correlated subjects have been worked out at the same time. One is the efficiency of the milkers in the relation of time and amount of milk. Another is the variation in the acidity of the milk comparing the first part and the last part of a lactation period, spring and fall, summer and winter changes of food, effect of the cow's health and many other very interesting factors connected therewith. This latter subject will be further investigated and the results published in a bulletin by itself.

One of the suggestions which has appeared during the investigations is that silage is a factor which causes a marked variation generally increasing the acidity of milk. A very important factor is suggested in relation to infant feeding of cow's milk. Cow's milk is high in acidity at the beginning of a lactation period, and the deductive inference to be made is that this high acidity is due to a high content of calcium phosphates, which is furnished for bone production in the young.

The young calf has bones very feebly ossified and cartilage, the basis of bone construction, is predominant so that the young calf needs the calcium phosphates which are the principle mineral constituents of bone. This the cow furnishes in her milk in excess for the first two or three weeks.

From this fact we can apply the philosophy of rational feeding of infants. If infants must be fed on cow's milk, they should be given milk from a cow or cows, whose lactation periods commenced about the time of the birth of the child. This method will secure for the child the elements in the milk needed at the proper time. Many a child is not nourished on account of receiving cow's milk too rich in fat or because the milk does not contain the proper amount in the right proportions of food ingredients for the child at certain periods in its development. Some of these facts have a marked influence on the high mortality of infants, during the summer months when the child's vitality is somewhat enervated by the hot weather.

Studies on the fermentation of silage have been continued for brief periods in two previous years and pretty thoroughly three years ago for the entire year. It has been discovered that the real process of silage fermentation is a very brief one and occupies but a few days after the silo is filled. As this is a report of progress a more detailed account will be published in bulletin form.

The studies thus far, indicate that the fermentation of silage which is concerned in the changes of sugar and perhaps some starch to alcohol, acetic, lactic, and butyric acids is a micro-organic one. Some serious losses have been discovered in siloing corn too green and in leaky silos. The juice which contains nearly all the sugar and other food ingredients is pressed out by the great pressure of silage above it and runs out of the silo a complete loss. A partial remedy for this is to allow the corn to stand longer, so the sugar will be turned to starch. Slightly frosted corn does not cause the loss that immature corn suffers. Silage must be raised to a certain high temperature before the proper fermentation occurs to preserve it. The preservatives are acetic, lactic and butyric acids. These compounds really pickle the corn and preserve it till it is exposed to the air where there are certain organisms able to destroy the acids and the silage spoils or decays. If the somewhat high temperature is not secured these preservative acids are not formed and silage will then decay from organisms present in the silage which are ordinarily killed by silage acids. When silage comes in contact with stone or cement construction the heat of fermentation is conducted away thus preventing the formation of acids and allowing the silage to spoil for a foot or less from the edges. So a wooden stave silo is the most economical and keeps the silage in better condition than any other kind of building material.

Silage contains from 1 to 1½% of acids and a cow consuming 40 lbs. of silage in a day would absorb as much acid as if she drank from 6 to 8 quarts of common vinegar in a day. Does this amount of acid cause any harmful effect on the health of the cow? This question is one which must be investigated and the truth of the matter determined.

The organisms which apparently cause the fermentation of silage are yeasts, lactic, butyric, and acetic acid bacteria. The yeasts and lactic acid bacteria commence the fermentation immediately, by the production of alcohol, CO_2 and lactic acid. Later the alcohol is changed to acetic acid. A number of new kinds of bacteria from silage have been isolated and analyzed, which will constitute quite a silage flora. There are many forms which are accidental and perform no function in fermentation of silage.

Quite a flora of the bacteria found in hay have been analyzed and filed. There are probably among them many new forms of bacteria. How many of these were agents in the fermentation and curing of hay cannot be definitely stated. The acid bacteria however were twice as high in percentage of numbers as on the grass made into hay.

Occasional samples of milk are tested for numbers of bacteria by request of citizens of the state, and sometimes milk is examined which is pathological in character, but the study of pathogenic bacteria is not considered a part of the functions of this department. Investigations have been made in cases of mastitis when the organisms causing the disease have been identified as Streptococcus pyogenes (bovis) and associated forms. It is intended in the future to be able to test for tuberculosis germs in milk.

Considerable interest is shown in the exhibit of samples of cream and milk at the Dairymen's Association convention held in January at Hartford. The endeavor in this part of the competition is to get milk and cream as free from bacteria as possible. The samples for the exhibit are tested in the Experiment Station Laboratory for the numbers of bacteria present in each sample.

The Gilbert Farm at Georgetown, an annex to the Connecticut Agricultural College, has won the highest score for the smallest number of bacteria for two years. This year the number was only 270 bacteria per cubic centimeter and a year ago it was only 280 bacteria per cubic centimeter. This exhibit of milk is educative for the production of clean milk. Those who are successful serve as examples and stimulate an effort by those who are not so successful.

Causes of the failure of eggs to hatch in incubators is under investigation at the present time from the pathological standpoint. The problems are: (1) Is the mortality due to bacteria within the egg, or to the lack of vitality in the embryo? (2) How much of this is to be attributed to the hen furnishing the eggs? Several hens which have died prematurely were examined and two of them had "Aspergillosis" of the oviduct. This disease is caused by a pathogenic mold called Aspergillus fumigatus. This mold is capable of growing in warm blooded animals. From another hen was isolated a pathogenic organism which causes a very remarkable green fluorescence or agar slants. This has been identified as Bacillus pyocyaneus, an organism which causes gangrene.

Another hen recently died from which an organism has been isolated, which shows marked characteristics growing in gelatin plates. The investigation so far shows three different organisms which have apparently caused death, one a mould and two bacteria. Eggs from these hens have shown a high mortality in attempts to hatch them. These are cases where eggs are weak in vitality from the pathogenic condition of the hen. It is possible that the primary cause of death of these hens examined has not been discovered, but what has been discovered is a secondary effect from some other cause.

W. M. Esten.

THE INTRACELLULAR ENZYMES OF PENICILLIUM AND ASPERGILLUS, WITH SPECIAL REFERENCE TO THOSE OF PENCILLIUM CAMEMBERTI.

BY ARTHUR W. DOX.

INTRODUCTION.

The importance of the lower plants in their relations to the various biochemical processes constantly going on about us is being recognized more and more as new data are accumulated. This field of research, which was first brought to the notice of scientists some fifty years ago, has proved one of the most interesting in the whole realm of biological chemistry. Although at the present time we are only on the threshold of any adequate conception of the various chemical processes which constitute life in its lowest forms, sufficient knowledge has already been gained to form working hypotheses, which not only explain many of the well-known phenomena but also aid in the discovery of new truth. Perhaps the most striking example of this fact is to be found in the development of our knowledge of enzymes or unorganized ferments, especially the intracellular enzymes. Most of the processes upon which life and growth are so intimately dependent can now be regarded as more or less simple chemical reactions, in which an enzyme plays the part of a catalytic agent. Duclaux even goes so far as to suggest that the life of bacteria is probably nothing more nor less than the sum total of all the activities of the intracellular enzymes present.

Long after enzymes were known and studied in their relation to the digestion of food, chemical reactions of a similar nature which took place through the intervention of micro-organisms were explained upon entirely different grounds. Thus the distinction was made between organized ferments and unorganized ferments or enzymes, the former term being practically synonymous with living cells. Pasteur was the first to show that different types of fermentation were caused by specific organisms, and his epoch-making researches revolutionized the contemporary theories regarding fermentation. The fundamental distinction between organized and unorganized ferments was finally broken down in quite recent years by Buchner. Claude Bernard had already suspected that the transformation of sugar into alcohol and carbon dioxide was due to the presence of an enzyme acting within the yeast cells, but his attempts to prepare this enzyme had resulted in failure. Buchner, however, showed conclusively that alcoholic fermentation could be carried on in the absence of yeast cells by an enzyme prepared from the yeast. Such enzymes, which, during the life of the organism act within the cell are now designated as endo-or intracellular enzymes. And it is by means of intracellular enzymes, prepared from the cells by suitable methods that many of the reactions, which were once thought to be absolutely dependent upon some mysterious vital activity, are now carried out in the absence of living organisms.

The distinction between intra and extracellular enzymes is in the main an arbitrary one. There is evidence to believe that the same enzyme may, in the earlier stages of growth of the organism, function as an intracellular enzyme, and later be liberated into the substratum as an extracellular enzyme. In the case of yeast, the amount of active sugar-fermenting enzyme or "zymase" set free in the medium during the normal course of organic growth is very small, the fermentation taking place mainly within the cells. This would account for the failure of the earlier observers to find any enzymatic activity in the medium after the cells had been removed. With molds the case is somewhat different. As the fruiting stage is reached, a considerable amount of enzyme is liberated into the medium. There is no particular reason for regarding this enzyme as different in origin and character from that remaining in the cell. For the sake of convenience, however, the distinction will be adhered to in this paper, as the work deals with the enzymes obtained directly from the mycelium.

The intracellular enzymes of certain groups of the lower plants have been investigated to a considerable extent, particularly the yeasts (1) and bacteria (2). The researches on the enzymes of molds, however, have been of a more or less desultory nature, and the results which are scattered over various chemical, biological, botanical and mycological journals, have not as yet been collected together. A great deal of this work has been carried out with organisms which have not been properly identified or where great confusion exists in the nomenclature. The results are in many cases somewhat uncertain, especially where insufficient data are given to make possible a repetition of the experiments. This point will be more fully discussed in the subsequent pages.

A study of fungi in general would of course be far beyond the scope of this paper. One great group, usually called the Hyphomycetes contains many species with wide distribution as saprophytes upon all kinds of substrata. In this group some five thousand species are described, with diverse relationship but held together by one common character—lack of sexual reproduction. Certain of these cosmopolitan groups of species together with certain of the Phycomyces make up the aggregation to which the term "molds" is commonly applied. Phycomyces or conjugating fungi include the well-known Mucors, the Peronosporeae or rotting molds, the Cystopi or white rusts, and many other parasitic fungi, such as the Saprolegniaceae or fish molds and the Entomophthoraceae or insect molds. Two other orders, the Uredineae or rust fungi and the Ustilagineae or smut fungi are likewise of great economic importance. Very few of these molds have ever been studied from the standpoint of biological chemistry. The great bulk of the work has been taxonomic and pathological in character.

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(1) Meisenheimer: Ueber die chemischen Vorgange bei den als Enzymreaktionen erkanntenGärungen. Biochem. Centralblatt 1907, 6, 621-633.

(2) Fuhrmann: Vorlesungen über Bakterienenzyme. Jena, 1907.

The organisms selected for investigation by chemists not having an intimate knowledge of mycology would naturally be those of wide distribution and omnivorous habits. In some of the earliest work, when a mold culture was desired, the medium was simply left exposed to the air until spontaneous inoculation ensued from the spores floating about in the atmosphere. Cultures obtained in this way usually consist of various species of two genera, Penicillium and Aspergillus, which are placed by Engler and Prantl in the family, Aspergillaceae. This family grouping is based upon certain species of each group for which sexual stages have been found, without necessarily implying that all described species of these two genera belong together. In fact, as these two genera are at present constituted, most of the described species belong rather to the Hyphomycetes than to the Aspergillaceae as considered by Engler and Prantl.*

The main morphological difference between Aspergillus and Penicillium is in the appearance of the fruit bodies. In Aspergillus the aerial filaments bearing the spores are generally formed of a single cell which swells out at the end into a sphere. Numerous cells radiate from this sphere, each bearing one or more chains of spores. In Penicillium, on the other hand, the aerial filaments send out branches which ramify again forming conidiferous cells, and these terminate in chains of spores. The general appearance is that of a broom, whence the name Penicillium. While various species of these genera may be closely related morphologically, they often show wide chemical differences. In fact some of them may be distinguished more readily by their chemical properties than by the aid of a microscope.

Penicillium and Aspergillus are both very widely distributed in nature. Almost any nutritive substance which contains a sufficient amount of moisture and is not positively toxic, will, if left exposed to the air for a short time, become infected with species of one or both of these genera. Every one is familiar with the appearance of moldy bread, moldy fruit and moldy cheese. And almost any solution containing carbon compounds which do not have antiseptic properties soon becomes covered with a growth of these molds, unless special precautions are taken to sterilize the fluid and prevent access of spores. Many of these molds grow equally well, if not better upon liquid than upon solid media, and in this respect present marked advantages over the Mucors for chemical studies.

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*Engler & Prantl: Die natürlichen Pflanzenfamilien.

Not only are the Penicillia and Aspergilli widely distributed in nature, but some of the species are of great economic importance. Two species of Penicillium are important factors in the cheese industry. The varieties of cheese known as Roquefort, Gorgonzola and Stilton owe their peculiar flavor to a green Penicillium (P. roqueforti), which grows in the numerous crevices and air spaces occurring throughout the cheese. Camembert cheese, which is manufactured both in France and in this country, is ripened by another Penicillium (P. camemberti), which grows upon the surface and secretes enzymes into the curd mass. The rotting of oranges is due principally to P. italicum and P. digitatum. The mold found upon rotten apples is almost invariably P. expansum. In fact, as Thom has pointed out, many of these organisms are so intimately associated with some particular habitat that it is quite easy to obtain a pure culture simply by making a careful transfer. Several species of this genus, especially P. brevicaule, possess the power of transforming arsenical compounds into diethylarsine, which can be recognized even in the minutest traces by its characteristic garlic odor. By virtue of this property, P. brevicaule has been employed very successfully as a biological test for arsenic. One-hundredth of a milligram of arsenic can be recognized in this way with certainty, the test being considered fully as delicate as Marsh's test.

The Aspergilli are of less economic importance than the Penicillia. The strong amylolytic power of some of the species is made use of in oriental countries. In the orient Aspergillus oryzae is used extensively in the preparation of an alcoholic beverage called Koji. This is made from rice by steaming the grains and inoculating with the mold which soon converts the starch into sugar. At the same time yeast develops and this transforms the sugar into alcohol and carbon dioxide.

Another species, A. Wentii, is used in Java for making a peculiar condiment or sauce from rice. Aspergillus oryzae, after it has been cultivated on starch, then extracted with water and precipitated with alcohol, constitutes the "Taka diastase" of commerce. Certain species of Aspergillus are of pathological importance on account of their parasitic habits. Thus A. fumigatus has frequently been found growing in the external auditory passage.

Many of the species of these two genera are particularly well adapted to chemical research on account of the readiness with which they thrive upon synthetic culture media. This is undoubtedly the reason why they have been chosen by so many investigators as a basis for chemical experiments. Where a complex medium of uncertain composition, such as bean decoction, meat extract, or the like, has to be used in order to obtain a suitable growth of mold, the changes that take place in the medium can not easily be followed. This difficulty is entirely avoided by the use of a synthetic medium of known composition. In such a medium where there is a single source of carbon or nitrogen, the carbon or nitrogen assimilation of the mold can be studied by simply varying the carbonaceous or nitrogenous constituent of the medium. As no other molds grow with such facility upon media of this character, these two genera have been used almost exclusively in such experiments.

The readiness with which these molds grow upon fluid media has already been mentioned. When it is desirable to separate the mycelium completely from the substratum, a liquid medium is practically essential. This is particularly true if determinations are to be made upon the mold itself to see what constituents of the medium have entered into the actual composition of the fungus. Solid particles adhering to the mycelium would introduce a considerable error. A liquid medium, on the other hand, can be washed out completely without much trouble. The same is equally true if the mold is to be used subsequently in enzyme experiments, where qualitative tests would be vitiated by the presence of a protein or carbohydrate introduced in this way. Thus for enzyme experiments the Penicillia and Aspergilli are pre-eminently adapted.

In the foregoing pages allusion was made to the polyphagous habits of Penicillium and Aspergillus. A number of investigators have made a careful study of the nutrition of these molds. The presence of proteins or highly complex nitrogenous substances is by no means necessary in the culture medium. The molds are able to synthesize their protoplasm from such simple substances as carbohydrates and nitrates or ammonium salts. While the sources of nitrogen and carbon may be varied within wide limits, the presence of certain inorganic salts in small amount is necessary. Most of the synthetic media commonly used in cultural work consist therefore of a dilute solution of these inorganic salts to which have been added a carbohydrate, such as ordinary cane-sugar, and a nitrogenous body varying in complexity from the nitrate of an alkali metal to a mixture of proteoses and peptones or gelatin. Nitrogen in some combined form is essential, for the molds can not utilize atmospheric nitrogen sufficiently to produce a normal colony. Often a slight growth of mold has been observed in the absence of nitrogenous compounds, but this is to be regarded as due rather to the reserve protein present in the spore itself or to a small amount of nitrogenous substance transferred to the medium during inoculation.

Many of the media in common use are unnecessarily complex. Raulin's fluid has been used perhaps more extensively than any other for cultivating molds. The inorganic constituents of this medium are quite numerous. The nitrogen is supplied in the form of ammonium nitrate and the carbon in the form of cane-sugar, while free tartaric acid is added mainly to prevent the growth of bacteria. Raulin found that the yield of mold was diminished to a greater or less extent when any one of the inorganic constituents was omitted from the medium. But as later work has shown, very few of these mineral salts are really necessary. The media introduced by Wehmer and Czapek are much simpler in this respect, yet the fungus growth is, to all appearances, equally good. Some of the metallic elements are needed in such minute traces that the molds can undoubtedly make up any deficiencies of the medium from the glass of the containing vessel.

A great variety of nitrogen compounds may serve as food material for Penicillium and Aspergillus. A glance at the formulas of some of the well-known fluid culture media will show that nitrates and ammonium salts can furnish all of the nitrogen. With these molds there seems to be no particular advantage in using organic compounds of nitrogen, although the molds can utilize amides, amino-acids, peptones and some heterocycles. In the case of amino acids according to Emmerling, the amino group must be in the alpha position with respect to the carboxyl, or else attached to alternate carbon atoms. Thus beta-amino-acids are unavailable as nutritive material, while gamma-aminobutyric acid yields a good crop of mold. Czapek found that Aspergillus niger could not utilize hydrazines, oximes basic heterocycles or cyanogen compounds. The writer has likewise repeatedly failed to obtain any growth of mold upon nitrates, or the salts of hydrazine or hydroxylamine. The mold does have the power of utilizing the nitrogen of certain heterocycles such as succinimide and nicotinic acid.

The source of carbon can likewise be varied greatly. Emmerling has shown that the molds grow luxuriantly upon a great variety of pentoses and hexoses. According to Reinke, the ordinary organic acids, except carbonic, oxalic and formic, when in combination with bases, are assimilated by P. glaucum. Moreover, cyclic compounds, such as parabanic and benzoic acids can supply the mold with carbon. Diakonow goes still further and states that even formic acid can be utilized by Penicillium. Hasselbring tested a number of carbon compounds with respect to their availability as sources of carbon, and found that P. glaucum assimilates alcohol, acetic acid, and substances from which the group CH^3COO- is easily derived. According to Czapek, the benzene ring is more readily attacked when it bears a number of hydroxyl groups, and such substances as quercite and quinic acid are easily assimilated. A great many of the substances, however, which are recorded in the literature as sources of carbon yield only a scanty growth which often fails to fructify. To secure a good thrifty colony, a substance containing one or more asymmetric carbon atoms seems to be necessary, and this is probably the reason why the sugars, from the trioses to the trisaccharides, are sources of carbon par excellence.

Since these two genera of molds, as all other fungi, contain no chlorophyll, they are obviously incapable of carrying out any photosynthesis. They must therefore derive their energy entirely from the chemical reactions which they institute in the culture medium. In other words, the medium must contain sufficient oxidizable substance or substance capable of undergoing exothermic changes to render the organism independent of solar energy. The chemical changes must of necessity be quite profound in order to meet these requirements. Aspergillus niger is said to have the power of converting one-third its weight of sugar into volatile products in a single day. While it destroys a smaller quantity of sugar than does yeast, it uses up the sugar more completely by combining it with oxygen. Assuming that the final products are carbon dioxide and water, the same amount of energy would be derived from one-twentieth the amount of sugar that the yeast consumes.

Some of the changes produced in the medium during the development of mold can not fail to be noticed by the most casual observer. For example, the change in color is usually quite pronounced. In some instances this change in color, or rather production of color, is so striking and characteristic as to form the basis for the specific name of the fungus. Thus P. purpurogenum colors the medium a brilliant reddish purple, and P. chrysogenum under certain conditions colors it a beautiful golden yellow. Nearly all the species when grown upon a colorless medium containing carbohydrate give rise to a brownish color, due probably to the formation of humus substances.

Other chemical changes, though not so easily detected by the eye, are none the less striking. If the reaction is at first acid to litmus, on account of the presence of free organic acid or acid phosphates, many species of Penicillium destroy the acid or else give rise to basic products, leaving the medium neutral or alkaline to litmus, though rarely alkaline to phenolphthalein. Other species produce acid substances and the substratum remains strongly acid to litmus. This seems to be particularly true of some of the Aspergilli. The cause of this acidity has been found by Duclaux to be due to the formation of oxalic acid. This is an intermediate product in the oxidation of carbohydrate, and if the mold is removed at the proper time, a large yield of oxalic acid may be obtained. Wehmer succeeded in obtaining 80 per cent. of the theoretical yield by the incomplete oxidation of cane-sugar by means of A. niger. In the presence of a calcium salt the oxalic acid is removed from solution as fast as it is formed and can then undergo no further oxidation. Under ordinary conditions, however, the oxalic acid accumulates only so long as an excess of sugar remains, and when this becomes scarce, the oxalic acid in turn is burned up. The Penicillia, on the other hand, do not seem to have the power of producing oxalic acid to so considerable an extent. But Wehmer has shown that certain of the species produce citric acid. The citric acid is likewise an intermediate product which finally disappears, and it apparently serves the same purpose as the oxalic acid, namely, that of controlling within certain limits the reaction of the medium.

In connection with the effect of fungus growth upon the organic constituents of the medium, the peculiar selective power of these organisms is worthy of mention. P. glaucum and A. niger have been used by a number of investigators for preparing optically active substances from racemic mixtures. This property was first observed in 1860 by Pasteur. He prepared a solution containing the ammonium salt of racemic acid and a small amount of inorganic phosphate, and inoculated it with spores of P. glaucum. After the mold had grown for a time the solution became levo-rotatory. The dextro acid was found to be completely destroyed while the levo acid remained intact. Le Bel used the two molds for preparing d-methylpropylcarbinol and l-propylglycol from the respective racemic mixtures. His cultures were, however, contaminated with yeasts and bacteria. In 1882 Lewkowitsch prepared d-mandelic acid from the racemic mixture by means of P. glaucum. Inactive lactic acid was converted in the same way into the levo form by Linossier. By the same method Schulze succeeded in preparing optically active leucine and glutaminic acid from the inactive mixtures. The amino acid remaining is always the one that does not occur in nature, and Schulze claims that these amino acids can be obtained in the form isomeric with the original substance by racemizing and then subjecting to the action of P. glaucum. Buchner notes that P. glaucum and A. niger grow readily upon the ammonium salts of fumaric but not on those of maleic acid, and gives us a method of separating isomeric mixtures where the isomerism is due to the presence of a double bond. In 1899 Fischer inoculated a solution containing dl-alanine and inorganic salts with A. niger, and found that 10 per cent. of the d-alanine was used up in fifteen days, the remaining solution being levo-gyrate. And still more recently Neuberg and Mayer obtained l-cystine from the inactive mixture by A. niger.

Other chemical changes in the medium, especially those of the nature of hydrolytic cleavage, such as the breaking down of proteins, the inversion of disaccharides and the liberation of ammonia from amides, are due to enzymes which can be made to act independently of the cells themselves. These changes will be discussed presently under the subject of enzymes.

Before entering upon a discussion of enzymes, however, it might be well to mention very briefly the behavior of these molds toward antiseptics. This problem has been studied by a great number of investigators, and so many observations have been reported that it would be out of the question to give a detailed discussion here. It is well known that molds are far less sensitive to antiseptics than are bacteria. The literature contains many observations of instances where these molds were found growing in solutions of substances known to possess germicidal properties. A table showing the relative toxicity of a number of the well-known antiseptics has been worked out by Malenkowitsch. According to his observations, the salts of the heavy metals are most toxic, while some of the organic antiseptics must be present in considerable amount before growth of mold is inhibited. It appears that those substances are most toxic which act oligodynamically, or those which, like chloroform, toluene and ether, have a solvent action upon fats and lipoids.

HISTORICAL REVIEW OF THE ENZYMES PRODUCED BY PENICILLIUM AND ASPERGILLUS.

Although the effect of Penicillium and Aspergillus upon various natural substrata and upon synthetic culture media had been observed for many years, the changes were not ascribed to the action of enzymes. This may be explained upon the ground that the enzymes are for the most part intracellular. Attempts to demonstrate the presence of an enzyme in the substratum after removing the mold would therefore result in failure. The secretion of enzymes into the culture medium does not ordinarily occur to any appreciable extent during the active vegetative period of the mold. But at the time of fructification and subsequently, some of the enzymes are liberated. Pathological conditions, such as exhaustion of the medium, lack of aeration or prevention of fructification, have a similar effect. The liberation of enzyme has been regarded by a number of investigators as due rather to the disintegration of some of the cells than to secretion by active living cells. Any procedure that tends to produce plasmolysis of the cells is therefore accompanied by liberation of the enzymes. Various methods of preparing enzyme solutions from molds are based upon this principle.

A method devised by Duclaux and used in a number of his experiments consists in allowing the mold to grow upon Raulin's fluid until spores begin to form, then syphoning off the medium and replacing it several times by distilled water, and then after the last traces of nutrient material have been washed out, allowing the mycelium to remain in contact with the distilled water for several hours. In this way the cells are made to yield up their enzymes to the water.

Another method, used by Bourquelot, is based upon the destruction of the cell wall by more heroic treatment. It consists in removing the mold at the appropriate time from the culture medium, and triturating it in a mortar with sand and chloroform water. The extract thus obtained is filtered and may be used either directly or else after precipitation with alcohol.

A third method consists in drying the mold at a low temperature (40°C) and grinding the resulting product to fine powder. The advantage of this method is that the enzymes in the dry state retain their activity much longer. A solution of the enzymes may be obtained at any time from this powder by simply extracting with water and filtering. These three methods have been employed in all of the earlier work on mold enzymes.

Two other methods introduced by Buchner have been used extensively in preparing yeast enzymes, but have only very recently been applied to molds. One of these makes use of the hydraulic press, which squeezes out the liquid contents of the cells. The other is the simple dehydration of the organism by means of acetone and ether. The latter method will be described more fully in the experimental part of this paper.

Most of the investigators have examined the enzymes at the time of fructification of the mold. This varies considerably with the individual species. Some of the green Penicillia produce spores within three days, while with other Penicillia the conidia may not appear until after a week or ten days. There appears to be good reason for preparing the enzymes at this particular stage if the maximum activity is desired. It can be shown experimentally that the amount of intracellular enzyme rapidly diminishes after fructification, and at the same time the enzymes begin to appear in the substratum. The proper time to prepare the intracellular enzymes is therefore just before fructification. The explanation given by some authors is that fructification is accompanied by a disintegration of mycelial cells, and the enzymes contained in them are thus set free. Histologists claim, however, that there is no evidence of any disintegration of cells, at least not until after the crop of spores is fully developed. It is not unreasonable to suppose that during the vegetative growth of the organism, the enzymes are constantly being produced and stored up within the cells. Then when spore formation begins it is accompanied by increased metabolic activity, and in response to the plant's greater need of easily assimilable nutrients, the enzymes are turned loose to act in the medium. Hence to obtain the greatest yield of endoenzymes they must be caught before they escape as ectoezymes.

Having briefly mentioned the general methods by which the intracellular enzymes of Penicillium and Aspergillus may be obtained, we now turn our attention to a consideration of the individual enzymes that have been found in these molds. With our present knowledge of zymology it is impossible to separate individual enzymes from a mixture. The only instance on record where a satisfactory separation has been accomplished is that described by Vines, where he isolated pepsin and erepsin from the mixture occurring naturally in plants. Most of the enzymes, however, are so closely similar in their solubility and behavior toward reagents that attempts to separate them have resulted in failure. But by preparing enzymes from different sources we can obtain preparations that are active toward certain zymolytes and inactive toward others, and in this way our knowledge of the specificity of enzymes has been acquired. When we have to deal with a mixture, therefore, as in the case of mold extracts, the different types of enzyme reactions can be studied separately by testing the activity of the mixture toward different substrata, and from these observations inferences can then be drawn as to the presence of the individual enzyme responsible for these reactions.

The enzymatic activities ascribed to Penicillium and Aspergillus species are briefly stated in Wehmer's review. As this author does not, however, give any description of the methods employed by previous investigators in their search for enzymes, it was thought advisable to discuss the literature somewhat in detail in this place. The methods and results will be given as described by the authors, and with very little critique. Later on it will be shown that the results obtained by the different investigators are not strictly comparable with each other nor with those obtained by the writer, owing to the fact that different species were used. The differences are, however, quantitative rather than qualitative.

PROTEASE

An examination of the literature will show at once that the proteolytic enzyme of Aspergillus and Penicillium has received more attention from previous investigators than any other single enzyme. Yet there are so many conflicting statements that the identity of this enzyme is by no means established. Hansen was the first to turn his attention to this subject. He found that when P. glaucum was grown upon 6 per cent. gelatin, the latter was rapidly liquefied. He also made a glycerol extract of the mold just after the liquefaction of the medium had begun and only a few spores had formed. This extract was found to liquefy gelatin in neutral solution more rapidly than in the presence of acid. Attempts to prepare the enzyme in the dry state failed. Several years later Wehmer confirmed the observations of Hansen. He found that various species of Penicillium and Aspergillus liquefy the gelatin of culture media to a considerable distance beyond the colony itself or beyond reach of the mycelium. The liquefaction was greatest when gelatin was the only source of carbon.

Bourquelot studied the proteolytic enzyme of A. niger after it had been cultivated on Raulin's fluid. An extract of the mycelium was prepared by triturating with sand and chloroform water. To one portion of this extract a few flocks of fibrin were added, while in another portion were placed a few pieces of coagulated egg-white, and both were warmed to 40°C. In both cases there was an unmistakable formation of peptone. The filtered liquid gave only a slight cloudiness with nitric acid, and a characteristic red biuret reaction. Bourquelot concludes therefore that the extract contained trypsin. In testing for pepsin, he followed the same procedure, except that the liquid was made 0.2 per cent. acid with hydrochloric acid. There was a disintegration of the fibrin and a slight solvent action upon the albumin. But the tests for peptone were negative, and the author considers that the presence of pepsin is very doubtful. Bourquelot noticed also that cultures of A. niger possess the property to a limited extent of liquefying gelatin.

In 1900 Malfitano made a more detailed study of the protease of A. niger. He used Fermi's liquid gelatin method. The method as adapted by Malfitano consists in mixing 10 cc of the solution to be tested with 5 cc of a warm solution of 20% gelatin containing 0.2% thymol. At room temperature the mixture is solid, but at 35°C it is liquid. The mixture is left in the thermostat for a given length of time, then cooled down to 15°C. If any digestion has occurred, the solution remains liquid, otherwise it quickly solidifies. By means of this method, Malfitano was able to make a number of interesting observations. He found that the enzyme was active only in acid solution. He studied the enzyme in the medium (Raulin's fluid) as well as that in the mycelium. In the medium the enzyme showed its greatest activity when the mycelium had reached its maximum growth. The quantity of enzyme was found to be dependent upon the intensity of development of mycelium and upon the degree of maturity. Conditions of aeration or temperature had no direct influence, except in so far as they influenced the growth of mold. He found that cubes of coagulated egg-white or flocks of fibrin when introduced into Raulin's fluid in place of the nitrogen-containing salts failed to yield any growth of mold. Casein and gelatin furnished an available source of nitrogen, and were still more readily attacked in the presence of other nitrogenous food material.

Malfitano studied also the proteolytic enzyme contained in the mycelium. The enzyme solution was prepared by Bourquelot's method of grinding the mycelium with sand and chloroform water. The activity of the enzyme in the mycelium was found to reach its maximum at the time of spore production; then the cells begin to yield up their enzyme to the medium and the enzyme in the medium increases at the expense of that in the mycelium.

In a second paper Malfitano describes an experiment in which A. niger was allowed to develop until the time of sporulation, then the mycelium was removed from the medium and dried at 35°C. An extract of this product digested gelatin readily, and the formation of protogelatose, deuterogelatose and gelatin peptone was demonstrated. The extract would not digest Mett's tubes of coagulated egg-albumin nor boiled fibrin. Fresh fibrin, on the other hand, was digested in the presence of one-hundredth normal acid, while the fibrin in the control test merely swelled. Milk first curdled and then digested, but the coagulum first formed did not disappear completely. The presence of caseose and peptone was demonstrated in the digested milk.

In the same year Steffens reported some observations on the relation between the formation of proteolytic enzymes and the nutrition of mold. He used four species of Penicillium—P. glaucum, P. luteum, P. rubrum, and P. italicum—and five of Aspergillus—A. niger, A. glaucus, A. oryzae, A. Wentii and A. fumigatus. These were all grown upon five different media, as follows,—Raulin's fluid, starch paste, starch paste and peptone, diluted milk, and egg-white and water. After eight days the mold was ground with sand and chloroform water, filtered, and the enzyme precipitated by alcohol. Its digestive action was tried upon egg-albumin, casein, filbrin and "vegetable casein" in the presence of 0.2 per cent. hydrochloric acid and 0.2 per cent sodium carbonate. The author used the biuret test to determine whether digestion had taken place. This he considers more delicate than Fermi's gelatin method, for it gave positive results where Fermi's test was negative. Needless to say, he obtained evidence of digestion both in acid and alkaline solution of all the four proteins used. No mention is made of control tests with boiled enzyme or with the enzyme solution alone.

A study of the effects of living molds upon proteins was made by Butkewitsch. He found that when A. niger was grown upon "Witte peptone," most of the nitrogen was converted into ammonia, which neutralized the oxalic acid produced simultaneously. Other nitrogenous substances among which were leucine and tyrosine were also formed, but in relatively small amount. P. glaucum, on the other hand, produced much less ammonia and relatively more amino acids. As no oxalic acid was produced by this organism, the reaction of the medium became alkaline. Butkewitsch claims that the proteolysis is due to the secretion of an enzyme resembling trypsin. This enzyme is contained not only in the mycelium but also in the culture medium. When the mold is grown upon peptone, more proteolytic enzyme is formed than when the source of nitrogen is ammonium tartrate. The further decomposition of the amino acids into ammonia is an independent process which serves the purpose of maintaining the proper reaction of the medium. It may be influenced in a variety of ways. If calcium carbonate is added to the Aspergillus culture, the oxalic acid combines with it and prevents its accumulation in the medium. Consequently there is no need of ammonia and less is produced. These conditions may be reversed in the case of Penicillium. If phosphoric acid is added to the Penicillium culture which normally produces very little ammonia, there is a marked increase in ammonia formed.

A comparison of the results obtained by these authors would indicate that the organisms studied contain a protease that acts readily upon gelatin and less readily upon fibrin and egg-albumin. In spite of conflicting statements regarding the effect upon fibrin and egg-albumin, the authors have held to the view that the enzyme is of the nature of trypsin.

NUCLEASE

The effect of cultures and enzyme preparations of A. niger and P. glaucum on thymonucleic acid was studied by Iwanoff. He found that while the sodium salt of thymonucleic acid could not supply the molds with carbon, it furnished a good source of nitrogen and phosphorus. The molds were accordingly grown upon a nucleic acid solution to which had been added cane-sugar, magnesium sulphate and potassium chloride. After several days the culture fluid was found to give a precipitate of purines with ammoniacal silver nitrate and a copious precipitate with magnesium mixture. In one experiment which was conducted for thirty-two days, the decomposition of the nucleic acid was complete, 70 per cent. of the phosphorus appearing as inorganic phosphate and the other 30 per cent. entering into the cell structure of the fungus. The author showed by separate experiment that the cleavage could not have been caused by the oxalic acid produced by the mold. To prove conclusively that it was due to an enzyme contained in the mycelium, the latter was triturated to a paste with infusorial earth and added to a solution of nucleic acid containing 150 mg P^2O^5 and chloroform as an antiseptic. In two weeks 7 mg P^2O^5 and 12.7 mg nitrogen as purine bases were liberated. A control experiment with boiled enzyme gave no purine precipitate. The author claims that this enzyme, which he calls nuclease, is entirely distinct from the proteolytic enzyme, for the mycelium paste did not liquefy gelatin.

AMIDASE

An extensive study of the amidase of A. niger was made by Shibata in 1904. Previous to that time the power of fungi to liberate ammonia from amides and amines had been observed by Butkewitsch and others, but only in culture media. Shibata now succeeded in hydrolyzing these compounds by means of enzyme preparations. A. niger was grown upon a medium containing peptone, sugar and inorganic salts. Two methods were used in preparing the enzyme. The mycelium was collected and forced through a sieve, then it was either allowed to dry at ordinary temperature, or else treated with acetone and ether according to Albert and Buchner's method for yeast. A portion of the powder thus obtained was mixed with a solution of the substance to be tested, toluene added, and the mixture left in the thermostat for several days. The ammonia was then determined by distillation with magnesium oxide, or in the case of the less stable urea derivatives and acid amides, the method of Schlössing was employed. Urea and acetamide yielded the most ammonia, though appreciable amounts were also obtained with biuret, oxamide, benzamide, asparagine and alanine Urethane, guanidine, allantoin and uric acid gave no ammonia at all. Hippuric acid was decomposed into benzoic acid and glycocoll.

In repeating these experiments with an acetone preparation of yeast, Pringsheim obtained negative results. A suspension of yeast, however, readily liberated ammonia from amino compounds. It is evident therefore that the amidase of Aspergillus niger is more resistant to acetone and ether than that of yeast.

LIPASE

The fact that molds can utilize fats as well as carbohydrates was first noticed by Van Tieghem. He found that when a porous body that had previously been soaked in water was immersed in an animal or vegetable oil, the surface of this body soon became covered with a growth of mold, the predominating species of which was P. glaucum. And, strange to say, the mold thrived and produced normal fructification although apparently excluded from air by the layer of oil. At first there seemed to be no change in the oil, but after a time a white crystalline mat began to form where the oil was in contact with the mycelium. The crystals were needle-shaped, and were at first very small, but they increased in size until they attained a length of 1-2 mm. The author states that these crystals consisted of fatty acids, produced by hydrolysis of the fat.

Gérard cultivated P. glaucum upon Raulin's fluid to which a little monobutyrin had been added, and noticed that there was a liberation of butyric acid. The fat-splitting power of this organism was shown by him to be due to an enzyme contained in the mycelium. An aqueous extract of the mold had the power of hydrolyzing monobutyrin. To 100 cc of a 2 per cent. monobutyrin solution he added 30 cc of the mold extract. The number of cc of decinormal alkali that it required to neutralize this solution increased from 0.4 in the control to 2.5 in the digestion experiment in six days. This represents less than 3 per cent. of the theoretical yield of butyric acid, and the lipolytic action must therefore have been quite feeble.

Camus confirmed the observation of Gérard and found also some slight evidence of lipolytic action in A. niger. Cultures of P. glaucum upon monobutyrin grew poorly and the lipolytic action was not very marked. The medium did, however, increase in acidity, and this the author attributes to the liberation of butyric acid. In the case of A. niger, the lipolytic action was still more feeble.

Garnier grew A. niger upon a modified Raulin's fluid at 35°C, then filtered off the mycelium and allowed it to act upon a solution of monobutyrin in the presence of chloroform. A short time after inoculation, just as the spores began to appear, there was evidence of a small amount of lipolytic enzyme. The amount of this enzyme quickly diminished and remained very small for about eleven days. At the end of that time the activity began to increase without, however, becoming very marked. It reached its maximum on the fifteenth day, after which it remained practically constant for about two months. The same author studied the lipase of A. fumigatus and found it to be very feeble. Two days after inoculation a slight lipolytic action was observed, but this disappeared at the time of fructification. At the end of twelve days, when the surface of the colony was completely covered with spores, the lipase reappeared but only in small amount. A. flavus and A. glaucus behaved in the same way, though the latter yielded somewhat more lipase.

The action of P. glaucum on butter fat was studied by Laxa. He noticed that butter inoculated with this organism developed considerable acidity. By extracting the mycelium obtained by inoculating this organism on media containing asparagine and lactic acid, he obtained an enzyme which hydrolyzed monobutyrin.

In more recent years, Deleano has studied the lipase of several molds. He cultivated P. glaucum, A. niger, and A. flavus on Raulin's fluid for seventeen days. The mycelium was then filtered off and dried at 37°C. The medium upon which the molds had grown showed no lipolytic power. Various solutions were used in extracting the dried mold. Physiological saline with 5 per cent. glycerol, 1 per cent. sodium hydroxide, and 50 per cent. glycerol extracted no lipase. When the powder was extracted for two days in the thermostat with 1 per cent. sodium phosphate and 0.5 per cent. alcohol, some lipase was obtained. The extract made from A. niger in this way acted strongly upon tributyrin, feebly upon monobutyrin, while it had no action at all upon ethyl butyrate. A. flavus showed a feeble action upon tributyrin and ethyl butyrate, and none upon monobutyrin. P. glaucum failed to hydrolyze any of the three esters. From these experiments the author suggests the possibility of specific enzymes for different esters.

EMULSIN

A glucoside-splitting enzyme was observed almost simultaneously in 1893 by Gérard and by Bourquelot in two different molds. Gérard prepared an extract from the mycelium of P. glaucum by trituration with sand and preciptated the enzymes from this extract by the addition of alcohol. After dissolving and reprecipitating, the product was washed with ether and dried in vacuo. One-hundredth of a gram of this preparation hydrolyzed 10 cc of 1 per cent. amygdalin solution completely into glucose, benzaldehyde and hydrocyanic acid in twenty-four hours. Salicin was likewise completely hydrolyzed in the same length of time.

Bourquelot prepared his enzyme from A. niger by growing the organism on Raulin's medium until the time of fructification, then floating the mycelium on distilled water for several days. The solution obtained in this way when allowed to act upon amygdalin gave the characteristic odor of benzaldehyde within an hour. Bourquelot and Hérissey found that not only could amygdalin be hydrolyzed, but also salicin, coniferin, arbutin, aesculin, populin and phlorhizin. On the other hand, some of the less soluble glucosides such as solanin, hesperidin, convallamarin, convolvulin, digitalin and jalapin, remained unaltered.

A comparison of the emulsin of A. niger with that of almonds was made by Hérissey. He tested the action of the enzyme prepared from both sources on a number of glucosides. While the enzyme from A. niger was found to decompose populin and phlorhizin, the emulsin of almonds had no effect upon these two substances. There was also a decided difference in the rate at which the two enzymes decomposed other glucosides. The enzyme of Aspergillus acted more energetically upon arbutin than upon any other glucoside, while the reverse was found to be the case with the emulsin of almonds. Further investigation of the glucoside-splitting power of A. niger showed that the formation of this enzyme could be entirely suppressed by an excess of ammonium nitrate in the medium. But upon replacing this solution by water, an abundance of emulsin was formed. The author believes that a condition of starvation may result in the formation of enzymes that were previously absent.

The glucoside-splitting power of the same organism as well as that of A. glaucus and P. glaucum was investigated by Puriewitsch. This author experimented with the living mold. Pottevin found that a solution of A. niger which had been cultivated on Raulin's fluid acted on amygdalin and on beta-d-glucosides, but not on the two methyl-galactosides nor on lactose. When, however, lactose or methyl-d-galactoside was added to the culture medium, an enzyme capable of hydrolyzing them was developed.

Brunstein again took up the study of the effect of certain fungi on media containing glucosides. Among the organisms cultivated were A. niger, A. oryzae, A. Wentii, A. glaucus and P. glaucum. These were grown upon media consisting of Raulin's fluid and peptone, and after the mold had reached maturity, the culture fluid was replaced by a solution of glucoside. The relative nutritive value of the different glucosides was determined by noting the increase in weight of the mycelium. Coniferin was most readily utilized, while arbutin, helicin and salicin had a toxic effect. The latter was due to the liberation of the toxic substances, hydroquinone, salicylaldehyde and salicylalcohol, from these glucosides. Certain of the organisms overcame the toxic action of salicin by oxidizing the salicylalcohol liberated to aldehyde and then to salicylic acid.

"TANNASE"

The power possessed by Aspergillus and Penicillium to hydrolyze tannin was observed as early as 1867 by Van Tieghem. This author noticed that a solution of tannin does not undergo change if it is kept saturated with carbon dioxide or is rendered sterile by heating. But when the solution is left exposed to the air, molds make their appearance and decompose the tannin into gallic acid which crystallizes out. Inoculation of tannin solutions with pure cultures of P. glaucum and A. niger gave the same phenomena. As these attempts to decompose tannin by an extract of the mycelium were unsuccessful, he concluded that the decomposition of tannin with the formation of gallic acid was a true fermentation in Pasteur's sense, and he called it "gallic fermentation."

In 1900 Fernbach again took up the subject of gallic fermentation. He grew A. niger on Raulin's fluid in which the sugar had been replaced by tannin, and found that the tannin was slowly decomposed with the formation of gallic acid. An enzyme preparation obtained from this culture was more active and hydrolyzed a 10% solution of tannin at 50°C, so that on cooling, crystals of gallic acid separated out. The mold extract filtered through a Chamberland filter and added to a sterile solution of tannin gave the same results.

Almost simultaneously with Fernbach's work, Pottevin obtained an enzyme in the same way, which decomposed commercial tannin into gallic acid and 12-15% glucose. No tannase was formed unless tannin had been added to the medium on which the organism was grown.

The "tannin" used in these experiments must have been a glucoside of some sort.

ENZYMES ACTING ON CARBOHYDRATES

It is generally understood that the complex polysaccharides, as well as the more simple di-and trisaccharides, are not directly assimilable. They must first undergo a process of cleavage by which they are transformed into monosaccharides, and this is accomplished by various enzymes, each of which is specific for a particular carbohydrate. The specificity of these carbohydrate-splitting enzymes is very marked, and it is possible to prepare enzymes which act vigorously upon a single carbohydrate and no other. No one, however, has succeeded in separating mixtures of these enzymes, and where a given preparation acts upon a number of complex sugars, it must be assumed that the various activities are due to individual specific enzymes. The significance of this will at once be seen in a study of the lower fungi. As the molds can utilize a great variety of complex sugars, the enzymes which decompose these sugars must all be present together, unless we are to assume that the organism possesses a certain power of adaptation by which an enzyme is formed only when it is needed for the utilization of that particular substratum. With this view in mind we now turn our attention to a review of the various sugar-splitting enzymes found in Penicillium and Aspergillus.

AMYLASE

The formation of amylase by Aspergillus and Penicillium seems to be subject to variations depending upon the species and upon the nutrient medium on which the organism is cultivated. According to Duclaux, A. glaucus when cultivated on solutions containing calcium lactate as the only source of carbon produces amylase but no protease nor sucrase. On the other hand, when cane-sugar served as the source of carbon, sucrase was formed but no amylase. P. glaucum produced sucrase on both media, but the amylase was much weaker. With glycerol as the source of carbon, a feeble amylase was obtained. Duclaux states also that A. niger does not germinate on starch, but is able to utilize starch if the mold is first cultivated on a sugar solution and the mycelium transferred to an amylaceous medium. A. oryzae germinates on sugar solutions, but thrives less well upon such media than upon starch. According to Petit, P. glaucum and A. niger grow upon solutions of dextrin. The medium acquires a reducing power and maltose and dextrose may be demonstrated.

In general it may be said that the Penicillia secrete less amylase, and are consequently less well adapted to grow upon starch-containing media, than the Aspergilli. Hansen states that his Penicillium, which had been cultivated on gelatin, had no action at all on starch paste.

With an extract of the mycelium of A. niger, Bourquelot tested the amylolytic action on a 0.5% paste of potato starch. After thirty hours, the mixture gave no color with iodine, and with Fehling's solution a reduction was obtained corresponding to 92% of the theoretical amount of glucose.

The organism which produces amylase in greatest amount is A. oryzae. This is the source of the commercial "Taka diastase." A description of the preparation and properties of the enzyme is given in Takamine's paper. According to this author, the organism is grown on wheat bran, the mycelium extracted with water, and the extract precipitated by alcohol and dried. The resulting product is more active than malt diastase, and has the power of hydrolyzing one hundred parts of starch in ten minutes.

An interesting study of the effect of the culture medium upon the formation of amylase was made by Katz. He found that when the medium contained 0.25% starch, P. glaucum hydrolyzed the starch, so that in two days the iodine test was negative. The growth on starch was not, however, luxuriant. If the medium contained 1.5% cane-sugar in addition to the starch, the growth was more vigorous, but the disappearance of the starch was considerably delayed. Fifteen per cent. sucrose or 2% dextrose completely suppressed the production of amylase. This was not due to any effect upon the enzyme itself, for the amylase acts readily on starch when sugar is present in this concentration. An extract of the mycelium from a culture that had been obtained with 0.25% starch and 2% sucrose had no effect at all upon starch. Maltose and lactose did not suppress the amylase, even if present to the extent of 10%. Erythrodextrin had no effect, nor did quinic acid, glycerol, tartaric acid or meat extract when added to the medium. The addition of peptone caused the inhibitory effect of the sugar to vanish.

The formation of amylase by A. niger was less susceptible to these inhibitory influences than P. glaucum. On solutions containing only starch, the growth was slow and the amylase rather feeble. The disappearance of the starch was accelerated by the addition of 1.5% sucrose. Further addition of sucrose delayed the disappearance of the starch but a concentration of 30% did not suppress it. The mycelium yielded more amylase when the organism was grown in the presence than in the absence of starch. From these experiments, the author concludes that molds have the power of regulating the production of amylase according to the nutritive requirements, and that this power of regulation is more highly developed in P. glaucum than in A. niger.

INULASE

Before the enzyme inulase was discovered, Bourquelot had noticed that A. niger grew on a solution containing inulin as the only source of carbon as well as it did on cane-sugar. Several years after the publication of the paper by Green (Ann. Bot. 1. 233), Bourquelot again took up the subject of the cleavage of inulin by A. niger. An enzyme preparation of this organism obtained by Duclaux's method was found to act readily upon solutions of inulin. A 1.32% solution of inulin was converted in eighty-four hours at 17°C into 1.40% reducing sugar, while the rotation increased from -1.06 to -2.53. This represents complete hydrolysis. He states that yeast does not ordinarily ferment inulin solutions, but in the presence of a little inulase from A. niger the fermentation goes on very rapidly.

A more extended research into the inulase of A. niger and P. glaucum was made in 1903 by Dean. This author obtained the enzyme by cultivating these organisms for a week on media containing inulin, filtering off the mycelium and immersing it for five minutes in a mixture of absolute alcohol and ether. The mycelium was obtained, on drying, in the form of a grayish powder. This powder readily hydrolyzed solutions of inulin, but no inulase could be detected in the culture fluid upon which the organisms had grown. The enzyme was very sensitive to acids and alkalies. It was destroyed by sulphuric acid or potassium hydroxide in concentrations of .01 normal. The optimum temperature was determined as 55°C. The Aspergillus powder possessed a rather stronger inulin-splitting power than the Penicillium powder.

Saiki used a preparation of inulase obtained in this way from A. niger. By injecting it into the blood circulation of a rabbit he was able to prepare a serum containing anti-inulase and anti-sucrase.

RAFFINASE

Scheibler's discovery of a raffinose-splitting enzyme in yeast led Bourquelot in 1896 to search for this enzyme in A. niger. He mixed 50 cc of a 4% raffinose solution with an equal volume of the culture fluid upon which this organism had grown. In four days the rotation of the mixture had decreased from 4.8 to 3.0, and a reduction of Fehling's solution obtained corresponding to 0.66 g sugar. This represents one-third the amount yielded when raffinose is completely hydrolyzed. Bourquelot is cautious, however, about making any inferences as to whether the hydrolysis had gone beyond the formation of levulose and melibiose and decomposed the latter into dextrose and galactose.

Three years later, Gillot studied raffinose with reference to its availability as a carbohydrate food for A. niger. He prepared a culture medium which consisted of Raulin's fluid with raffinose in place of the sucrose. As the free tartaric acid in this medium was found to hydrolyze some of the raffinose at the temperature of the autoclave, the sterilization was effected by filtering through a Chamberland filter. When this medium was inoculated with A. niger a colony developed and produced normal fructification. Examination of the medium every twenty-four hours showed that the reducing sugar formed rapidly increased in amount while the amount of unchanged raffinose diminished. Oxalic acid was produced just as when cane-sugar furnished the carbon. The complete disappearance of the carbohydrate the author interprets as evidence of the presence of a second enzyme "melibiase," which breaks up the melibiose first formed into dextrose and galactose.

The hydrolysis and utilization of raffinose by Penicillium glaucum was next investigated by the same author. In the first series of experiments, the culture medium was prepared as before. P. glaucum inverted the raffinose completely in four days, though some of the reducing sugar remained until the twelfth day. To prove that the hydrolysis was really due to an enzyme, the mycelium was extracted by the method of Duclaux and the extract allowed to act upon raffinose. In twenty-six days the rotation had decreased from 8.8 to 6.2 and 0.324 g. glucose was formed corresponding to 22% hydrolysis. Instead of using an antiseptic in these experiments, the author heated the mixture every day for two hours at 55°C. He admits the inadequacy of this method as a means of sterilization, but states that in this case it was apparently effective.

SUCRASE

As early as 1858, Béchamp found that solutions of cane-sugar containing small amounts of inorganic salts became levorotatory on standing, while at the same time molds developed. A solution of pure sucrose in distilled water did not undergo change, and the solution containing salts likewise remained unchanged when a little mercuric chloride or creosote was added. The molds were not identified, but were described merely as green, yellow or white, and the mycelium as floating or submerged. There can be little doubt, however, that some of the molds at least were Penicillia or Aspergilli.

Twenty years later, Gayon cultivated P. glaucum and A. niger on solutions containing cane-sugar and noticed that the sugar rapidly became inverted. He noticed also an important distinction between these molds and some of the Mucors, the latter not having the power to invert cane-sugar. Several years later, Duclaux in studying the food value of different substances for A. niger, likewise noted that sucrose in the medium became inverted.

The presence of an intracellular enzyme responsible for the inversion of the sugar was definitely established by the experiments of Bourquelot. In his paper on maltose, Bourquelot states that an aqueous extract of the mycelium of A. niger hydrolyzes cane-sugar as well as maltose, and that the extract loses its activity on filtering through porous clay. Penicillium likewise yielded a mixture of enzymes, but in this case the action upon sucrose was much more energetic than that upon maltose or starch paste. In a later paper the same author showed that this enzyme solution added to an equal volume of a 2.5% sucrose solution gave the theoretical yield of invert sugar in twenty-four hours.

Fernbach made a detailed study of the sucrase of A. niger. He prepared a series of flasks, each containing the same amount of Raulin's medium, inoculated them as nearly as possible with the same number of spores and allowed the organism to grow at 35°C. At different stages of growth the mycelium was filtered off and the filtrate made up to a definite volume, then the invert sugar was determined. In three days the inversion was nearly complete and a large proportion of the sugar had disappeared, while in four days not a trace of sugar was left. Although in two days the mold had reached half its maximum weight, no inverting enzyme was found in the medium. But as soon as the medium became deficient in sugar the liberation of enzyme began, and in eight days there was six times as much enzyme in the medium as in three days. The diffusion of sucrase from the cells may be hastened by the exclusion of oxygen and consequent prevention of fructification. The author holds therefore that there is no genetic relationship between the formation of spores and the appearance of sucrase in the medium. This view leads to the assumption that the inversion of sugar is normally an intracellular process. Although the medium itself shows no marked sucroclastic action until fructification has begun or the liberation of enzyme has been induced by pathological conditions, the mycelium contains a very active sucrase from the start. Its activity gradually increases, and as the sugar becomes exhausted, the greater part of the intracellular enzyme is set free and appears in the medium.

According to Fernbach, the sucrase of A. niger is most active in an acid medium. He constructed a table showing the amounts of different acids that must be present to produce equal effects. This table was interpreted by Kanitz, who showed that the effect of the acid was determined entirely by the concentration of hydrogen ions. The optimum concentration of hydrogen ions for the sucrase of A. niger is from 1-3000 to 1-300 normal.

MALTASE

In his classic paper on the physiological properties of maltose, Bourquelot describes a series of experiments which demonstrate the presence of a maltose-splitting enzyme in A. niger and P. glaucum. He cultivated the organisms on Raulin's fluid, and when they had reached maturity, he syphoned off the culture fluid and replaced it first by water and then by a solution of maltose. By noting the decrease in rotation and determining the reducing power with Fehling's solution, he was able to prove that most of the maltose became converted into dextrose. Not only the living mycelium but also an enzyme obtained by precipitating an extract of the mycelium by alcohol had the power of transforming maltose into dextrose. The solution of maltase was found to lose its activity, considerably when passed through a porous clay filter. Aspergillus niger not only continued to grow when the medium was replaced by a solution of maltose and inorganic salts, but the organism germinated readily when such a solution was inoculated with spores. The maltase of P. glaucum was not as active as the sucrase present in the same extract.

Bourquelot's experiments were performed without the use of an antiseptic. Ten years later Hérissey prepared a maltase from A. niger by floating the mycelium on distilled water. The action of the enzyme was tested by the polariscope, and it was found that the addition of chloroform had no inhibitory effect.

LACTASE

Bourquelot and Hérissey failed to find any evidence of lactase in A. niger. Neither the medium nor the mycelium from cultures of this organism on ordinary Raulin's fluid had any effect on milk sugar. Only one instance is on record of the occurrence of lactase in these lower fungi. Pottevin confirmed Bourquelot's observation that A. niger when cultivated on Raulin's fluid produced no lactase. But when the culture fluid was replaced by lactose and inorganic salts, after the organism had begun to grow, the mold continued to develop and a lactose-splitting enzyme was found in the mycelium. The same was true of methyl-d-galactoside. This glucoside was not attacked by the mycelium extract unless the substance had been present in the culture fluid. The apparent power of this organism to respond to the nutritional needs by producing new enzymes would be very striking if the author had demonstrated conclusively that all traces of lactase were absent from ordinary cultures.

TREHALASE

The disaccharide trehalose was found in A. niger by Bourquelot, and its wide distribution in fungi was subsequently demonstrated by him. This substance is evidently a reserve carbohydrate stored up in the fungi, and before it can be utilized it must first be hydrolyzed into glucose. Accordingly Bourquelot examined the enzyme preparation obtained from A. niger to see if it was capable of hydrolyzing trehalose. On adding the enzyme solution to a solution of trehalose, the rotation decreased in a few hours, and the decrease continued until the sixth day when the hydrolysis was complete, as was shown by the fact that the theoretical yield of glucose was obtained. According to Bourquelot, trehalase may be distinguished from maltase by the much lower temperature at which it is destroyed. Trehalase loses its activity at 64°C, while maltase remains active until a temperature of 74°C is reached.

Theoretically, trehalose should be the food par excellence for this organism as it is stored up for that purpose. But Bourquelot has shown that spores of A. niger germinate very slowly on solutions of trehalose. This fact he explains on the ground that only those enzymes are produced during germination which act on the food material contained within the spore. Later on another category of enzymes is produced by the aid of which the organism can utilize the substances which it has stored up during a previous period of growth.

GENTIANASE AND GENTIOBIASE

Gentianose, like raffinose, is a trisaccharide, and according to Bourquelot would require two distinct enzymes for its complete hydrolysis. Top yeast accomplishes the first stage of the reaction but carries it no further. Emulsin of almonds then acts on the disaccharide formed and completes the hydrolysis. Bourquelot found that A. niger, when grown upon Raulin's fluid, produces both enzymes, as a complete hydrolysis of the gentianose occurred, yielding three molecules of hexose.

MELIZITASE

Melizitose is another trisaccharide that would require two enzymes for its complete hydrolysis. The first stage is the cleavage into dextrose and turanose. The latter may then be still further decomposed by the action of dilute acids into two molecules of dextrose. Bourquelot and Hérissey found that only the first stage of this hydrolysis can be accomplished by A. niger. A 2.5% melizitose solution mixed with an equal volume of the Aspergillus extract and allowed to digest for four days gave a decrease in rotation and a reduction of Fehling's solution, but the hydrolysis was not complete.

OTHER ENZYMES FOUND

ZYMASE

Among the molds there are various transitional forms from the strictly aerobic type to those which readily adapt themselves to anaerobic conditions. Penicillium and Aspergillus belong to the former class, but even here we have quantitative differences. According to Duclaux, Aspergillus differs from Penicillium in that it can support a lack of oxygen for a longer time and with less injurious effects. It can even adapt itself for a certain length of time to an almost total deprivation of oxygen. When the organism is cultivated under partially anaerobic conditions, a small amount of alcohol may be detected in the medium. In the case of P. glaucum the amount of alcohol thus formed rarely exceeds one-thousandth of the total volume of the medium. This rapidly disappears again when access of air is restored.

The most successful experiments along this line are those of Kostytschew. This author first cultivated A. niger on a modified Raulin medium in which the cane-sugar was replaced by dextrose. The rate of production of carbon dioxide was studied both with air access and after the air had been replaced by nitrogen. A marked diminution in the formation of carbon dioxide occurred after excluding the air. In a second series of experiments, a culture of this organism three days old was sunk to the bottom of the flask by means of sterile glass beads. The air was then replaced by nitrogen and the flask sealed. After fourteen days in the thermostat the culture fluid was analyzed The dextrose had decreased from 10.3296 g to 10.0043 g, while .1563 g carbon dioxide and .1420 g alcohol had been formed The ratio between these two products is practically the same as that in the fermentation of sugar by yeast. The loss of sugar not represented by the carbon dioxide and alcohol the author ascribes to the formation of oxalic acid. From these experiments it is clear that the anaerobic respiration of A. niger takes on the character of an alcoholic fermentation when the mycelium is completely submerged. When the surface of the culture is exposed to an inert gas, the amount of carbon dioxide formed is insignificant.

Shortly after the publication of Kostytschew's paper, Junitzky proved that the anaerobic formation of carbon dioxide and alcohol by A. niger was due to an enzyme, closely resembling if not identical with the zymase of yeast. He grew the mold on Raulin's fluid until fructification began, then he ground the mycelium with sand and pressed out the juice in a Buchner press with three hundred atmospheres. A solution of glucose was added to this juice and the amount of carbon dioxide and alcohol determined after twenty-four hours. Although only a small percentage of the sugar was fermented and a large amount of enzyme had to be used, the presence of a zymase was demonstrated. This zymase was formed by the mold during its ordiary aerobic vegetative processes.

OXIDASE

Molds do not produce the characteristic oxidizing enzymes to anything like the extent to which such enzymes are found in many of the higher fungi. Bourquelot who studied the oxidase and laccase of mushrooms as well as many enzymes of A. niger and P. glaucum, reports no observation whatever of the occurrence of any oxidizing enzymes in these lower fungi. Shibata, in his study of the amidases, failed to find any tyrosinase in A. niger. Yet it has long been known that the common molds grow normally only in the presence of oxygen and that the medium must contain an oxidizable substance. As the ultimate products are principally water and carbon dioxide, we must assume that an oxidation takes place.

Herzog and Meier studied the effect of cultures of P. glaucum upon various hydroxy-acids in the medium. Cultures were made upon diluted beer-wort, and when the rate of production of carbon dioxide had become constant, they added a solution of the hydroxy-acid and determined the increased output of carbon dioxide as well as the amount of acid consumed. A fairly constant ratio was found between the increase in carbon dioxide and the disappearance of the acid. Lactic, tartaric, malic, mandelic and beta-hydroxybutyric acids were readily hydrolyzed, while glycolic, citric, pyroracemic and hydroxyisobutyric acids showed no appreciable oxidation. The presence of an asymmetric carbon atom is therefore necessary. On killing the mold with acetone or methyl alcohol and quickly drying, the authors obtained a powder which likewise liberated carbon dioxide from hydroxyacids.

In a second paper, the same authors showed that the optical antipodes of hydroxy-acids are oxidized at different rates. This explains the separation of racemic mixtures by cultures of fungi, first observed by Pasteur. An enzyme prepared by treating the mycelium with liquid air was found to liberate carbon dioxide from lactic acid. The authors call the enzyme "acidoxydase."

Part of this carbon dioxide undoubtedly comes from the carboxyl group of the acid. In the case of cinnamic acid this type of reaction has been demonstrated. Oliviero showed that A. niger and P. glaucum transform cinnamic acid into styrene. The organisms were grown on Raulin's fluid until mature, then shaken violently to liberate the enzyme and filtered through a Chamberland filter. On the addition of small quantities of sodium cinnamate, the characteristic odor of styrene was noticed. Herzog and Ripke confirmed this observation by growing P. glaucum upon a large amount of beer-wort to which ammonium cinnamate had been added. In three days the characteristic odor of styrene was noticed, and the substance was isolated and identified.

SUMMARY OF LITERATURE.

A considerable number of enzymes has been found by previous investigators in species of Penicillium and Aspergillus. Those which have been shown to act in the absence of living cells are:—Protease, nuclease, lipase, emulsin, amylase, inulase, raffinase, sucrase, maltase, trehalase, gentianase, melizitase, amidase, zymase and oxidase. Some of these occur in very active form; others are more difficult to demonstrate on account of the small amount present. Lactase is said to occur only when lactose is the source of carbon in the culture medium. The nature of the protease has not been established, though most of the authors consider it as closely resembling trypsin.

EXPERIMENTAL.

CHEMICAL DIFFERENCES IN SPECIES OF PENICILLIUM.

The résumé of literature to which the preceding pages have been devoted comprises both the intra-and extra-cellular enzymes of Aspergillus and Penicillium. It will be seen that with very few exceptions previous work has been confined to two species,—A. niger and P. glaucum. This is particularly true of those investigations which deal primarily with the intracellular enzymes. Cultures of these organisms are easy to obtain, as they make their appearance spontaneously upon almost any kind of substratum that contains a carbohydrate. Many of the cultures for enzyme experiments were undoubtedly obtained in this way; for some authors admit having made transfers from media that had accidently become contaminated with these molds. With what care the organisms were identified, it is of course impossible to say. The fact that binomial nomenclature is used leaves it to be inferred that the cultural aspects and morphology were found to correspond with the original description. Assuming then that this agreement was found, the results are comparable provided the original description is sufficiently accurate to include only a single species. As far as A. niger is concerned, this is probably true. VanTieghem's description of this organism is accurate and minute and moreover there are very few organisms which might possibly be mistaken for A. niger. On the other hand, Link's description of P. glaucum is so vague as to include all green Penicillia. In fact the designation "P. glaucum" has almost come to be synonymous with "green mold."

The question now arises, do all species of Penicillium show the same physiological and chemical characteristics? A detailed discussion of these fungi from the standpoint of taxonomy would of course be out of place in this paper. Suffice it to say that there are a number of green Penicillia, all of which answer to Link's description of P. glaucum, but which show marked chemical differences under definite conditions. In an unpublished monograph by Dr. Charles Thom, the manuscript of which the writer has had the opportunity of reading, some half dozen commonly occurring green Penicillia are described. Cultural studies of these organisms show that some liquefy gelatin and some do not; some secrete a red or yellow dye into the medium while others do not; and some give a characteristic odor which others fail to produce. Morphological differences are likewise to be found. It is therefore not improbable that differences in enzymatic activity may be equally pronounced. While there is some controversy as to whether it is justifiable to distinguish species on purely physiological grounds, yet in chemical experiments these chemical differences should be taken into account. Many of the conflicting statements in the literature, especially those concerning the proteolytic enzymes may be explained on the assumption that different organisms were used under the same name. If species so closely related show decided chemical differences, still greater variations may be expected where morphological differences are more pronounced.

ORGANISM SELECTED—PENICILLIUM CAMEMBERTI

In selecting a Penicillium for enzyme experiments, the writer has endeavored to use one whose identity is fully established and to obtain pure cultures from a reliable source. For a number of reasons, *P. camemberti* was considered particularly well adapted for these experiments. The cultures were obtained from Dr. Chas. Thom, of the U. S. Department of Agriculture, by whom the fungus was first described. The organism in question is of considerable economic importance because of its association with the cheese industry. It is the principal factor in the ripening of the well-known Camembert type of soft cheese. The manner in which it produces the ripening will be discussed in connection with the proteolytic enzyme. So intimately is this mold associated with Camembert cheese and so readily is it recognized that it is not a difficult matter to obtain a pure culture by simply making a transfer from a Camembert cheese purchased in the market. This mold possesses the additional advantage of thriving admirably under artificial conditions and producing a dense mycelium rich in enzymes.

CHOICE OF A CULTURE MEDIUM

Having secured the organism in pure culture, a number of experiments were made in order to determine what medium was most suitable for propagating it. Obviously, if the mycelium of the mold is to be prepared in the form of a dry powder as free as possible from nutrient material, a solid medium such as gelatin or agar is undesirable. All of the fluid media described by Raulin, Wehmer, Czapek, Dean, and a host of others, consist essentially of a carbohydrate solution to which a few inorganic salts have been added. Raulin's fluid is particularly adapted to A. niger, but it has been used a great deal for other species also.

The choice of a medium for P. camemberti was therefore carefully considered at the outset. Inoculations were made upon most of the media described in the literature, and while the organism seemed to thrive upon all of them, the media which gave the most luxuriant growth were those of Raulin and Czapek, sodium nitrate being added to the latter as the source of nitrogen. Where cultural studies are to be made to determine the effect of nutrition on the secretion of enzymes, other carbohydrates may be substituted for the cane-sugar. For such experiments Raulin's fluid is objectionable, as it contains enough free acid to decompose some of the more easily hydrolyzable carbohydrates during sterilization. In Czapek's fluid, the acidity is due entirely to acid phosphates, and experiments showed that raffinose, inulin, etc. could be sterilized in this medium without undergoing decomposition. This medium was therefore adopted for the sake of uniformity. Its composition is as follows:

Water	1000.0
Magnesium sulphate (cryst)	0.5
Potassium acid phosphate	1.0
Potassium chloride	0.5
Ferrous sulphate	0.01
Sodium nitrate	2.0
Cane-sugar	30.0

METHODS OF CULTURE

This medium was placed in a large number of Erlenmeyer flasks to the depth of about 3 cm. The mouth of each flask was then closed with a cotton plug, and the flasks sterilized in an autoclave at 110°C for half an hour. Occasionally a slight cloudiness appeared in the medium after sterilization, due probably to the precipitation of magnesium phosphate, but this disappeared after the mold had begun to grow. Inoculations were made from a pure culture by means of a sterile platinum wire. The cultures were allowed to develop in diffuse daylight at laboratory temperature. In about three days white specks were seen floating on the surface of the fluid, and these rapidly spread until the whole surface became covered with a dense white mycelium. The mycelium continued to develop and increase in thickness until about the tenth day, when the bluish green color of the spores began to appear.

PREPARATION OF ENZYME POWDER

Experiments showed that the intracellular enzymes are present in greatest amount just before the fruiting stage is reached. By this time the sugar, which was completely inverted some days previously, is nearly used up. The reaction which was at first acid is now neutral or slightly alkaline to litmus. If now the culture is allowed to go on still further and the surface of the colony to become covered with spores, the enzymes are rapidly liberated into the medium and the mycelium is found to be less active.

Just as the colored spores began to appear, therefore, the mold was removed and treated according to Albert and Buchner's method for preparing "Acetondauerhefe." The method as adapted to these experiments is as follows:—The whole mycelium, which can be removed from the flask in the form of a thick disc, is immersed for a few moments in running water, then squeezed to remove as much as possible of the water, and run through a hashing machine. The wet mass thus obtained is immersed for ten minutes in a large volume of acetone, with constant stirring, then it is filtered off with suction. It is now immersed again for two minutes in a fresh quantity of acetone and filtered as before. The third time it is immersed in ether for three minutes, sucked as dry as possible and spread out in a thin layer for several hours until the odor of ether is no longer perceptible. A coarse dry powder results, which is ground still finer by a suitable grinding machine.

COMPOSITION OF ENZYME POWDER.

This powder contains, besides the enzymes, all the constituents of the cells that are not soluble in acetone and ether. Needless to say, the osmotic pressure produced within the cells by this treatment ruptures the cell walls, so that the enzymes can easily be extracted by subsequent treatment with water. The lipoids, however, have been removed almost completely by the acetone and ether. The acetone from the first extraction has a bright yellow color, and when distilled until aqueous vapors begin to pass over, yields a flocculent precipitate which has an odor like that of some of the terpenes. The extracted powder is white or greenish in color and is practically anhydrous. It easily becomes electrified so that the particles tend to fly apart. It contains 4.50% ash and 4.35% nitrogen. The greater part of the nitrogen is not in the form of true protein, but consists of chitin or nitrogenous cellulose. About 1% of nitrogen can be extracted by water. The aqueous extract has an opalescent appearance, and gives the biuret, Millon and Hopkins-Cole reactions, though rather feebly.

EXPERIMENTAL METHODS.

In all the experiments about to be described, unless otherwise indicated, this powder was used either in suspension or in the form of an aqueous extract as the source of enzyme. The advantage of this method is that a preparation of uniform activity can be used in a whole series of experiments. The powder when kept out of the light and in well stoppered bottles seems to retain its activity indefinitely. A specimen more than a year old is apparently as active as it was when freshly prepared.

The digestions were all carried out in a thermostat maintained at a temperature of 35-37°C. Two to five per cent. of toluene, depending upon the amount of surface exposed was used as an antiseptic unless otherwise indicated. All the tubes and flasks were tightly stoppered to prevent any change in volume by evaporation and any loss of toluene. Whenever aliquot portions were taken for analysis the mixture was first cooled down to laboratory temperature. The time of digestion varies in the different experiments, but is stated in each case. Control experiments were usually made, either with a mixture of zymolyte and boiled enzyme, or else with zymolyte and unboiled enzyme separately.

ENZYME STUDIES.

PROTEASE.

Extracellular protease—Cheese-ripening. The economic importance of P. camemberti depends upon its proteolytic enzyme. In the manufacture of Camembert cheese, the mold makes its appearance on the surface of the cheese soon after its removal to the ripening room. The mold continues to develop, and about the time the fruiting stage is reached, a softening of the curd appears just under the mycelium. This softened layer rapidly increases in depth, until in four or five weeks the hard curd has assumed a soft waxy texture throughout. The change is evidently due to an enzyme secreted by the mold and liberated into the curd mass. Investigations by the writer* have shown that this change in physical appearance of the curd is accompanied by chemical changes which consist in the conversion of the insoluble paracasein into soluble proteoses and peptones and amino acids.

Intracellular protease. The proteolytic enzyme is also contained in the mold powder in the intracellular form and its presence can readily be demonstrated. As will be seen shortly, the formation of protease is independent of the presence of protein in the culture medium. It occurs when the mold is grown upon sugar and sodium nitrate, as well as when gelatin or peptone have furnished the nitrogen. The proteolytic activity of the powder obtained as described above was tested with a number of proteins. As the soluble protein of the mold itself gives the biuret reaction and undergoes autolysis with the formation of tryptophane, these reactions could not be relied upon to show positively whether the added protein had actually been digested. The change in solubility of the protein was therefore taken as the criterion.

The first tests were made with the two proteins most commonly used in demonstrating both peptic and tryptic enzymes-coagulated egg-white and fibrin. In these experiments as well as in those following, an enzyme solution was prepared by extracting the mold powder for two hours with twenty times its weight of water.

Experiment 1. Ten cc of the filtered extract were placed in each of three small Erlenmeyer flasks. To the first was added 1 cc of 1% HCl to the second 1 cc of 1% Na^2CO^3 solution, and to the third 1 cc water. In each of the flasks were placed two Mett tubes of coagulated egg-white. At the end of a week the tubes were examined and none of them showed any signs whatever of digestion.

Experiment 2. The above experiment was repeated, using a small flock of fresh fibrin in place of the Mett tubes. In about three days the fibrin in the flask containing alkali showed signs of disintegration, and at the end of a week it had completely disappeared. The fibrin in the neutral medium also showed some solution, though not quite so marked. The acid fibrin was least altered. This evidence of digestion of fibrin by the mold extract

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[*] Dox: Proteolytic changes in the ripening of Camembert cheese U. S. Department of Agriculture. B. A. I. Bulletin No. 109 (1908).

is, however, offset by the fact that the fibrin in the control flasks with boiled enzyme behaved in the same way, though the rate of digestion was somewhat slower, especially in the neutral flask. The disappearance of the fibrin was probably caused in part at least by leucocyte enzymes present in the fibrin.

Experiment 3. The behavior of the mold extract toward boiled fibrin was then tested. The experiment was conducted exactly as described above, except that boiled fibrin was substituted for the fresh fibrin. At the end of a week the fibrin in all of the flasks was apparently unaltered. In the presence of acid a swelling had occurred, but no signs of disintegration.

Experiment 4. The colorimetric method recently described by Roaf* was also tried. This method makes use of fibrin that has been stained with Congo red and the dye rendered permanent by immersing the fibrin in boiling water. A liberation of color from fibrin carefully prepared in this manner indicates proteolysis. Ten cc of the mold extract were used as before, in acid, alkaline and neutral solution, and approximately equal amounts of stained fibrin. After five days only a very slight amount of color was liberated, the intensity of which was about the same as that in the corresponding control tests.

Experiment 5. A number of other proteins were tested with respect to their digestibility by the mold enzyme. The same amount of extract was used, and the tests carried out in acid, alkaline and neutral media. At the end of a week the acid or alkali that had been added was exactly neutralized by an equivalent amount of alkali or acid, and in the case of the globulins the precipitation was aided by heating. The protein was then filtered on a tared filter paper, dried at 110°C and weighed. The control experiments are given here only where they show a decided difference from the others.

Protein added	Protein recovered.		
0.1g	neutral	N/20 HCl	N/20 Na^2CO^3
Zein . .	.0998	.0996	.0987
Cryst. Edestin	.0989	.0993	.0987

*Roaf: A new colorimetric method to show the activity of either peptic or tryptic enzymes. Biochem. Jour. 3, 188-192.

Excelsin	.0990	.0991	.0970
Elastin	.0997	.1002	.0980
Collagen	.0991	.0996	.1005
Ovovitellin	.0978	.0982	.0974
Cocoanut protein	.0991	0982	.0990
Casein	.0006	.0876	.0323
Casein (control)	.0994	.0980	.1003

Of the eight proteins tested, casein is the only one that was appreciably digested. The activity of the enzyme toward this protein is greatest in the very faint natural acidity of the extract. The digestion is less rapid in the presence of sodium carbonate and is almost inhibited by hydrochloric acid of the strength used. In the former case, the weakening of the enzyme probably occurred before the alkali had combined with the casein, because “nutrose” the sodium salt of commerce was found to digest readily. The readiness with which the enzyme digests casein is not surprising in view of the fact that this protein forms the natural habitat of the organism, and is so easily digested by the living mycelium.

Experiment 6. As the living organism has also the power of growing on gelatin and liquefying it, the enzyme might be expected to act in the same way. The effect of the enzyme solution on this albuminoid was tested by Fermi's[*] method with liquid gelatin.

In each of three tubes, 5 cc of 20% gelatin containing thymol were placed. The jelly was liquefied by warming to 35°C, then 5 cc enzyme solution were added and 5 cc water. In one tube the mixture was made acid by the addition of hydrochloric acid to 0.1% to another sodium carbonate was added to 0.1% and the third was made neutral. Control tubes were prepared in the same way by adding boiled enzyme. The mixtures were left in the thermostat at 35°C for twenty-four hours. Then they were removed and cooled down to 15°C by immersion in running water. The contents of the tubes to which the unboiled enzyme had been added remained liquid, with the exception of the acid gelatin, while those containing boiled enzyme quickly solidified to a stiff jelly.

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[*] Fermi: Reagentien und Versuchsmethoden zum Studium der proteolytischen und gelatinolytischen Enzyme. Arch. f. Hyg., 55, 140-205. (1906).

Experiment 7. The action of the enzyme on gelatin may be demonstrated with equal readiness by Fermi's method with tubes of solid gelatin.

To each of three small test tubes 2 cc of 10% gelatin containin 0.2% thymol were added. One was made 0.1% acid with hydrochloric acid, another 0.1% alkaline with sodium carbonate and the third was kept neutral. Two cc of a 3 per cent. mold extract were then added to each, and the same amount of acid or alkali as the gelatin contained. A few drops of toluene were added and the tubes left at room temperature. Every twenty-four hours the level of the gelatin was marked on a strip of paper pasted on the tube. The acid gelatin showed no signs of digestion, in fact there was a slight swelling above the mark indicating the original level. In the other tubes the linear liquefaction was as follows.

Hours.	Neutral mm	Alkaline mm	Acid mm
24	4	1	—
48	7	2	—
72	9	2	—
96	10	2	—

Experiment 8. It has already been shown that the enzyme does not act on coagulated egg-white in Mett tubes. A solution of crystallized egg-albumin was tested in order to see if different results might be obtained.

Ten cc of the enzyme solution were used and 2 cc of a solution of crystallized ovalbumin. After remaining four days in the thermostat, the solutions were made just faintly acid and the unchanged albumin coagulated by boiling. This precipitate was filtered and washed, and the nitrogen determined by the Kjeldahl method.

Enzyme	Coagulum (g nitrogen)		
	neutral	0.1 HCl	0.1% Na^2CO^3
unboiled . .	.0339	.0357	.0348
boiled . .	.0344	.0359	.0358

Neither coagulated egg-white nor soluble ovalbumin undergoes any appreciable digestion.

Experiment 9. Casein, as has been seen, is readily digested by this enzyme. In order to determine to what extent the digestion goes on, the following experiment was carried out. Ten grams of casein "nach Hammarsten" were suspended in 200 cc water. Five grams of mold powder were extracted for two hours with 100 cc water, then filtered and added to the casein suspension. The bottle containing this mixture was placed in a bath maintained at a temperature of 40°C and shaken at frequent intervals during the day. In about two days the casein had begun to disappear. In a week it had all disappeared with the exception of a scum which remained in the layer of toluene at the surface. This scum was filtered off, dried at 100°C and weighed. Eight-tenths of a gram was obtained and the phosphorous content was found to be 0.76% It was probably unaltered casein containing adsorbed impurities from the enzyme solution. The filtrate which was yellow in color, was left in the thermostat until the digestion had gone on for 32 days. At the end of that time the total nitrogen, the nitrogen in the filtrate after precipitating with tannic acid, and the nitrogen as ammonia were determined, also the total and inorganic phosphorus. The difference between the first two determinations represents caseoses and peptones, that between the second and third represents amino acids.

10 g casein, 200 cc water, 100 cc 5% mold extract .

days	nitrogen as-	in 10cc g	nitrogen calculated as-	g
0	total nitrogen	.0036		
32	total nitrogen	.0444	proteoses and peptones	.0105
32	tannin filtrate	.0339	amino acids	.0312
32	ammonia	.0027	amomnia	.0027
55	total nitrogen	.0444	proteoses and peptones	.0060
55	tannin filtrate	.0384	amino acids	.0357
55	ammonia	.0027	ammonia	.0037

32 total phosphorus in 50 cc .0120.
32 inorganic phosphorus in 50 cc .0124.

The digestion of casein goes beyond the peptone stage, the principal products being amino acids. The solution gave a pink biuret reaction and a strong trypotophane reaction with bromine water.

The material remaining after the analytical determinations had been made was evaporated to a syrup and allowed to stand in a cool place for several days. Characteristic crystals of tyrosine and "leucine" separated out, and these were identified under the microscope.

Experiment 10. The proteoses and peptones which are formed as intermediary products in the digestion of casein are rapidly broken down into simpler products. Although fibrin is not acted upon by this enzyme, it was thought that the proteoses and peptones derived from fibrin might be attacked more readily. The following experiment was therefore made. Three grams of "Witte peptone" were dissolved in 50 cc water. Two grams of mold powder were extracted for two hours with 50 cc water, filtered and added to the peptone solution. After remaining in the thermostat for fourteen days, nitrogen determinations were made as in the preceding experiment.

3 g Witte peptone, 50 cc water, 50 cc enzyme, 14 days.

nitrogen as-	in 10 cc g	nitrogen calculated as-	g
total nitrogen	.0444	proteoses and peptones	.0099
tannin filtrate	.0345	amino acids	.0320
ammonia	.0025	ammonia	.0025
	Control,	boiled enzyme.	
total nitrogen	.0444	proteoses and peptones	.0336
tannin filtrate	.0108	amino acids	.0096
ammonia	.0012	ammonia	.0012

Influence of acid and alkali. In the experiments with Witte peptone, as well as in the casein experiment, no acid or alkali was added to the digestion mixture. The extract from the mold, however, was faintly acid to litmus, though neutral to methyl orange and dimethylaminoazobenzene. The acidity persisted after the digestion had gone on for some time. To determine the effect of acids and alkalies a series of tests was made. Different amounts of decinormal acids and alkalies were taken and the total volume made up to 10 cc with distilled water, then 0.1 g Witte peptone was added and 0.1 g mold powder. After twenty-four hours in the thermostat, the tryptophane test was applied, using the same number of drops of bromine water in each case. With hydrochloric, lactic and phosphoric acids the intensity of the color decreased with increasing concentration, until with N/20 acid the test was negative. Akalies were much less inhibitory than acids. The reaction was still positive, though quite faint, when sodium carbonate or ammonia was present in decinormal concentration.

Summary. From the experiments described above, it will be seen that the intracellular protease of P. camemberti readily digests casein, gelatin and Witte peptone, but has no action on fibrin, ovalbumin or other native proteins. In this respect it is closely analogous to the protease discovered by Cohnheim (1) in the intestine of mammals, and named by him *erepsin.* Vines has found erepsin in a large number of plants, and has been able to separate it from the peptic enzyme which usually accompanies it. According to Vines (2), "The ereptase of plants differs from that of animals only in that its reaction range is more extensive in the direction of acidity, and is, perhaps, less extensive in the direction of alkalinity."

At the time the protease of molds was being investigated by Bourquelot and others, erepsin had not been discovered. These authors regarded the enzyme as closely resembling, if not identical with trypsin. There is a possibility that the organisms studied, especially A. niger, secrete a small amount of peptic or tryptic enzyme, enough to account for the digestion obtained in some cases with fibrin, or it may be that the fibrin itself contained proteolytic enzymes from the leucocytes.

To determine whether the liquefaction of gelatin was due to a specific "glutinase," the writer prepared an extract from a dog's intestine and tested its action on gelatin by Fermi's method, with positive results. The digestion must have been due to erepsin, for the same extract had no action on fibrin.

NUCLEASE.

In Iwanoff's paper, which is the only one in the literature having to do with the enzyme of molds which acts on nucleic acid, the author states that the organisms were cultivated on media containing nucleic acid. His results show no evidence that a mold will pro-

(1) Cohnheim: Zeitschr. f. Physiol. Chem., 33, 451-465 (1901).

(2) Vines: Annals of Botany, 89, p. 17 (1909).

duce nuclease when it is cultivated upon a medium consisting entirely of carbohydrate and inorganic salts. The experiments described in the preceding pages have shown that the production of protease in P. camemberti is independent of the presence of protein in the culture medium. Whether nuclease is produced under similar conditions was an important point that remained to be investigated.

A specimen of yeast nucleic acid from Parke-Davis Co..was purified by dissolving and precipitating by alcohol. Five grams of the product were dissolved in just enough dilute potassium hydroxide to give a solution neutral to litmus. Two grams of mold powder were extracted for an hour with 100 cc water, filtered and the solution added to the nucleic acid solution. The total volume was then made up to 250 cc, and toluene added for an antiseptic. After 45 days in the thermostat at 35-37°C, the solution was tested with ammoniacal silver nitrate and magnesium mixture. Both of these reagents gave a precipitate, while in the control experiment the precipitates obtained were almost negligible. One hundred cc of the solution were taken for the purine determination. The purines were precipitated by copper sulphate and sodium bisulphite, washed with hot water and decomposed by hydrogen sulphide. The filtrate after boiling off the excess of hydrogen sulphide was reprecipitated by copper sulphate and sodium bisulphite. The amount of precipitate was not large enough for a separation of the purines, so the nitrogen contained in it was determined by the Kjeldahl method. Total phosphorous and phosphorus as phosphoric acid were determined in 50 cc portions. The results are expressed as grams per 100 cc.

	g
Total nitrogen	.1788
Purine nitrogen	.0663
Total phosphorus	.0859
Phosphorous liberated	.0512
Control, boiled enzyme.	
Total nitrogen	.1788
Purine nitrogen	.0036
Total phosphorus	.0859
Phosphorous liberated	.0041

There can be no doubt that the decomposition of the nucleic acid was due to an enzyme. And it is evident that the nuclease of P. camemberti is formed irrespective of the presence of nucleic acid in the culture medium. The decomposition is more complete than that obtained by Iwanoff, owing to the greater length of time through which the enzyme acted, and probably also to a greater activity of the enzyme preparation. Iwanoff's enzyme failed to liquefy gelatin, although at least one of the organisms used by him, A. niger, has been shown by other investigators to contain a gelatin-liquefying enzyme. These investigations, however, are not strictly comparable with those of Iwanoff, because of the different methods of culture and the different conditions of the experiments. It will be noted that the ratio between the purine nitrogen and the phosphorus liberated is different from that obtained by Iwanoff with thymonucleic acid. (p. 392).

AMIDASE

It was seen in the experiments under protease that the mold powder had the power of liberating ammonia from casein and Witte peptone. This effect might be attributed to a deamidizing enzyme. The liberation of ammonia from the protein molecule during proteolysis is probably due to a breaking down of such amides as asparagine and glutamine, which are intermediary products, into ammonia, and aspartic and glutaminic acids. If this is the case, the same enzyme might be expected to hydrolyze other amides in a similar manner.

In the following experiments the enzyme preparation from the sucrose medium was tested with several amino compounds. A weighed quantity (0.2 g) of the substance was dissolved or suspended in 20 cc water, and 0.5 g mold powder added. Toluene was used for an antiseptic. After several days in the thermostat, the contents of the flasks were transferred to cylinders and the ammonia determined by Folin's method. The following figures were obtained.

Substance	Days	$N/5H^2SO^4$	Control	N as NH^3
		cc	cc	g
Urea	4	6.3	0.5	.0174
Asparagine	4	5.0	0.2	.0144
Biuret	5	0.4	0.2	.0006
Alanine	5	0.7	0.8	.0015
Acetanilide	5	0.8	0.8	.0000
Benzamide	5	0.9	0.2	.0021

Urea and asparagine are both readily acted upon. Benzamide and alanine are hydrolyzed to a considerably less extent, while the hydrolysis with biuret is doubtful.

Hippuric acid-splitting enzyme. The mold powder was found to have the power of hydrolyzing hippuric acid into benzoic acid and glycocoll (aminoacetic acid). The experiment was conducted as follows. Two-tenths of a gram of hippuric acid was dissolved in just enough sodium hydroxide to give a neutral reaction with litmus. The volume was made up to 20 cc, and then 0.4 g mold powder added. At the end of a week the mixture was filtered and the calculated amount of sulphuric acid added to combine with the sodium. This solution was shaken several times with petroleum ether in a separatory funnel, and the petroleum allowed to evaporate. A crystalline residue was left, which after recrystallization from water melted at 121°C and had the crystalline appearance of benzoic acid. In the control experiment with boiled enzyme, no residue was obtained on evaporating the petroleum. On repeating the experiment and extracting first with ethyl acetate according to the method of Bunge and Schmiedeberg, the weight of the benzoic acid obtained was 0.1085 g. As 0.2 g hippuric acid yields 0.148g benzoic acid on complete hydrolysis, the hydrolysis in this case is 76%.

Remarks. The effect of cultivating the organism on media containing amino compounds would probably be an increase in the amount of amidase produced by the mycelium. This point, however, still remains to be determined. So far as the influence of nutrition on the production of enzyme has been studied in the case of the carbohydrate-splitting enzymes, as will be pointed out later, the effect has been to increase the production of the specific enzyme necessary for the hydrolysis of the given substratum. There is no reason why the same relation between substratum and enzyme formation should not hold true also for other enzymes such as amidase.

LIPASE

The lipolytic activity of the enzyme powder prepared from cultures of P. camemberti that had been grown on cane-sugar was very feeble. This might be expected in view of the small amount of lipase obtained by other investigators who worked with P. glaucum and A. niger. By carefully titrating the acid formed after the enzyme had been allowed to act upon the ester, a slight lipolytic activity could be demonstrated. In these experiments an extract of the mold powder, prepared as already indicated, was used. The extract alone showed no appreciable increase in acidity after remaining in the thermostat throughout the experiment. Ten cc of the enzyme solution were diluted with an equal volume of water and 0.2 cc of the ester added. A few drops of toluene were added for an antiseptic, and the mixture left in the thermostat for three days. The solution was then titrated with decinormal sodium hydroxide, using phenolphthalein as an indicator.

Ester	N/10 NaOH	Control
	cc	cc
Triacetin . . .	1.6	1.0
Monobutyrin . . .	1.8	1.0
Amyl acetate . . .	1.4	1.2
Ethyl butyrate . . .	2.0	1.3
Ethyl acetate . . .	1.4	1.1

In every instance there is a slight increase in acidity, though in some cases it is only very slight indeed. Glycerin monobutyrin and ethyl butyrate gave the greatest increase, while with amyl acetate and ethyl acetate the increase is much smaller.

The very slight extent to which the esters were hydrolyzed may be explained in two ways—there may be a loss of enzyme during the process of preparation, or it may be that the culture medium was unsuitable for the production of lipase. It has been claimed that during the extraction of fat from seeds a considerable part of the lipase goes over into the ether extract. According to Taylor,* lipase is insoluble in ether, but is soluble in ether containing a fatty body. If such is the case, part of the lipase may be lost when the mycelium of the mold is treated with acetone and ether. Again, the lack of lipase may be due to the fact that the medium contained no ester to stimulate the formation of the enzyme. As will be seen in subsequent experiments with other enzymes, there seems to be a greater formation of a specific enzyme when its particular zymolyte is present in the medium. By analogy, the production of lipase would be increased by cultivating the mold on a medium containing a fat or an ester.

Cultures of this organism do have the power of hydrolyzing fat under proper conditions. An experiment was made in which a suspension of pure butter fat in a solution of inorganic salts was inoculated with P. camemberti. The mold grew very slowly at first, but after a time the growth appeared to be normal. The butter fat changed its appearance completely, and a white mass of minute crystals was formed.

Further experiments will be conducted to determine whether the fresh mycelium is more active than the "dauer" preparation and whether the presence of fat in the medium increases the amount of lipase formed.

EMULSIN

Just as the four enzymes already discussed are formed in the absence of their respective zymolytes from the culture medium, so emulsin is formed in the absence of glucosides. The same powder that was used in the preceding experiments was tested with respect to its glucoside-splitting power. The following glucosides were used—amygdalin, arbutin, salicin, and phlorhizin. Two-tenths of a gram of the glucoside was dissolved in 20 cc water and 0.1 g mold powder added. After three days in the thermostat, the mold powder was filtered off and the solution tested to see if hydrolysis had occurred.

Amygdalin when completely hydrolyzed yields dextrose, benzaldehyde and hydrocyanic acid. All three of these products were demonstrated in the digestion mixture. A strong odor of bitter almonds at once revealed the presence of benzaldehyde. The presence of free hydrocyanic acid was shown by distilling a portion of

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*Taylor: On the action of lipase. Journ. Biol. Chem., 2, 87.

the liquid from a test tube and testing the distillate with ferrous sulphate and ferric chloride, whereupon a precipitate of Prussian blue was obtained. The glucoside was identified by its osazone.

Arbutin hydrolyzes into dextrose and hydroquinone. In the presence of the enzyme, the solution rapidly darkened in color on account of the oxidization of the hydroquinone. When tested with·Fehling's solution, black oxidation products were formed as well as a heavy precipitate of cuprous oxide.

Salicin breaks up into o-hydroxybenzylalcohol and dextrose. The former was recognized in the digestion solution by the deep violet color it gave with ferric chloride. The dextrose was identified as before by the formation of insoluble osazone.

Phlorhizin when hydrolyzed, yields dextrose and phloretin, and the latter on further hydrolysis gives phloretic acid and phloroglucinol. After the enzyme had been allowed to act on this glucoside, a reduction of Fehling's solution was obtained amounting to 0.0170 g cuprous oxide for 0.2 g of the glucoside. Only a partial hydrolysis was obtained in this case. The digestion mixture did not give a color with ferric chloride, showing that there was no liberation of phloroglucinol.

From the above experiments it will be seen that three typical glucosides, amygdalin, salicin and arbutin are readily decomposed by an intracellular enzyme produced when the mold is cultivated on a medium containing only a carbohydrate as the source of carbon. Phlorhizin is also hydrolyzed, though less readily and less completely.

ENZYMES ACTING ON CARBOHYDRATES

The carbohydrate-splitting enzymes present in extracts or suspensions of the mold can readily be demonstrated by several methods. The first consists in observing the change in optical rotation of the carbohydrate solution to which the enzyme has been added. Another method depends upon the increase in reducing power as determined by Fehling's solution. As only two of the ordinary hexose anhydrides, lactose and maltose, reduce Fehling's solution before inversion, this test may be applied qualitatively. The third method depends upon the formation of an osazone separating from the hot solution and having a characteristic appearance under the microscope. When this method is applied to solutions containing the more complex polysaccharides, such as starch, dextrin and inulin, the latter must first be removed from the solution by precipitation with alcohol. The first two of these methods give very accurate results and may be used for quantitative work. The osazone method, however, is merely qualitative and may even give negative results where only a small proportion of the sugar has been inverted.

CARBOHYDRATE IN THE MOLD

In all the enzyme experiments in which the hydrolysis is measured by sugar determinations, a slight correction must be made for reducing sugar formed by the autolysis of the mold. It was found that 0.1 g of the mold powder suspended in water and kept at thermostat temperature for three daysgave 0.0060 g cuprous oxide, while the control with boiled enzyme gave no reduction at all. A number of similar experiments showed that the amount of reducing sugar formed in this way was fairly constant. The sugar was found to yield an osazone separating from the hot liquid and having the crystalline appearance and melting point of phenylglucosazone. It is not unlikely that this reducing sugar has been a source of error in the work of previous investigators.

By using a small amount of powder, say 0.1 g, the error is reduced to a minimum. It is very small in proportion to the amount of reducing sugar formed from the added carbohydrate, and it has no appreciable effect upon the optieal rotation. In most of the determinations the amount 0.0060 g is simply deducted from the weight of the cuprous oxide obtained. This slight error may be eliminated entirely as was done in the case of one or two experiments by subjecting the autolyzing mold extract to dialysis in a collodion bag until the sugar formed had disappeared. This procedure seemed to weaken the enzyme to some extent, and this is very likely due to a destructive action of the proteolytic enzyme, for according to Vandervelde* most enzymes do not pass through celulose membranes. When the fresh mold, or a preparation dried in the air or in vacuo without acetone or ether is used, the error is somewhat greater.

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*Vandervelde: Ueber Diffusion von Enzymen durch Cellulose-membrane. Biochem. Zeitschr., 1, 399-408 (1906).

The source of this monosaccharide is not yet definitely known. The mold contains one or more polysaccharides or perhaps a hemicellulose, which gives an opalescent appearance to the aqueous extract, and which may be precipitated in an amorphous condition by the addition of alcohol. The red color obtained with iodine suggests the presence of glycogen. It is very probable that an enzyme acts on one of these carbohydrates, liberating a monosaccharide.

On allowing the acetone to stand after it had been used for extracting the mold by the Albert-Buchner method, needle-shaped crystals soon formed on the walls of the containing vessel. In order to determine the nature of this substance the crystals were dissolved in water and allowed to crystallize again. On evaporating, a sweetish syrup was obtained, which after several days crystallized in long needles. The crystals melted at 166°C, did not rotate the plane of polarized light, and did not reduce Fehling's solution before or after boiling with acid. These are all properties of mannite, a hexatomic alcohol which is known to occur in many of the higher fungi.

PURPOSE OF EXPERIMENTS.

The purpose of the experiments which follow is not only to demonstrate the presence of the different carbohydrate-splitting enzymes, but also to show the influence of nutrition upon the relative amounts of the enzymes formed. With the exception of the paper by Katz (cf p. 400) on the regulatory formation of amylase, that of Pottevin (cf p. 405)on the formation of lactase in cultures upon lactose, and a few bare statements by Duclaux, very little is known about the influence of nutrition of molds upon the relative amounts of intracellular enzymes produced. This question of nutrition was studied especially in connection with the carbohydrate-splitting enzymes of P. camemberti.

METHODS.

In testing the influence of nutrition upon the relative activities of the intracellular enzymes, the following procedure was adopted.

A series of culture media was prepared, consisting of the usual inorganic salts, and 3% of another carbohydrate in place of the sucrose. The media were sterilized and inoculated in the usual way with spores of P. camemberti. The flasks were all kept under the same conditions of temperature and light, and the organism allowed to reach the same stage of development in each case. Then the mycelium was removed and dehydrated by the usual method with acetone and ether. The preparations obtained in this way were used throughout the whole series of experiments and the results are therefore strictly comparable. In order to determine the efficiency of the acetone-ether method as compared with simple dehydration of the mycelium in vacuo, a preparation made by the latter method was included in the series, and will be designated as "dried mycelium." Preparations from mycelia grown upon the following carbohydrates were tested—sucrose, maltose, lactose, glucose, starch paste and inulin. In a series of test tubes 10 cc of a 2% carbohydrate solution were placed and 0.1 g mold powder from the different sources indicated. Toluene was used for an antiseptic, and the mixture kept in the thermostat for a given length of time. Then the enzyme action was arrested by plunging the tubes into boiling water. After cooling, the solutions were clarified by shaking with a definite volume of alumina cream and filtering. The rotation of the resulting solution was determined in a Schmidt and Haensch triple field polariscope, using a 100 mm tube. The readings are expressed in degrees Ventzke. Assuming that the change in rotation is proportional to the change in specific rotation when the carbohydrate is hydrolyzed by acid, the percentage of hydrolysis obtained can be calculated roughly. Although this method of calculation may not be strictly accurate, it gives approximate values which may be used for comparison.

Having briefly outlined the methods, we now turn our attention to the data obtained by their application. The enzymes will be discussed in the same order that was followed in the historical review. As some of the rarer carbohydrates, such as trehalose, melizitose and gentianose could not be procured, the observations are confined to the more commonly occurring carbohydrates.

AMYLASE.

Although P. camemberti will grow upon media containing various forms of starch as the source of carbon, the growth is not as rapid as that obtained with the simple mono- and disaccharides. At the outset the germination of the spores is somewhat delayed, but later on the organism seems to adjust itself to the medium, and finally a dense mycelium is formed and normal fruiting bodies appear.

Starting with the same amount of carbohydrate in the medium, soluble starch required several days longer for its complete disappearance than did sucrose. In nine days the medium no longer gave a color with iodine, but the achroodextrins persisted four or five days longer. In the case of starch paste the hydrolysis was still slower. At the end of ten days the upper layer of the medium was clear and gave no iodine reaction,but below this there was a layer of unchanged starch. Achroodextrin is much more readily utilized, and the delay in the germination of the spores is less pronounced.

As might be expected in view of the "regulatory formation" of amylase discovered by Katz in another species of Penicillium, P. camemberti when grown upon sucrose does not produce any great amount of amylase. When a 1% paste of arrow-root starch was treated with 2% its weight of mold powder from the culture grown on sucrose, a blue color was still obtained with iodine after the mixture had been in the thermostat for a week. The failure to digest starch paste could not have been due to a destruction of amylase by the acetone-ether treatment, for a similar test with a fresh culture that had been dried directly gave results that were practically negative. In this case, however, the iodine reaction at the end of a week was somewhat purplish, showing that a portion of the starch must have been converted as far as the erythrodextrin stage.

The amylolytic activity of the enzyme preparation was more pronounced when soluble starch was used in place of starch paste. Twenty cc of a 1% solution of soluble starch when digested with

0.1 g of the powder (from sucrose) for three days gave .0685 g cuprous oxide. Deducting .0060 for the blank, it will be seen that the amount of reducing sugar formed, calculated as dextrose, is .0286 g, or nearly 13% of the theoretical yield. At the end of a week no iodine reaction was obtained. The exact time required for the starch to reach the achromic point was, however, not determined in this case. The reducing sugar was calculated as dextrose for the reason that it yielded an insoluble osazone on treatment with the phenylhydrazine reagent, and this osazone was further identified by its crystalline form as phenylglucosazone. The maltose which is no doubt formed as an intermediate product is evidently quickly decomposed into dextrose by another enzyme.

The activity of the amylase is extremely small compared to that of malt or saliva. The highest dilution at which the enzyme could still be demonstrated was determined in the following way. A 2% solution of soluble starch was prepared and 10 cc placed in a series of test tubes. An extract of the mold powder was also prepared by extracting a gram of the mold powder for two hours with thirty times its weight of water. Different amounts of this extract were added to the starch solution and the total volume made up to 15 cc. From time to time the progress of the digestion was determined by testing a portion of the solution with iodine. The data are tabulated below.

Mold Extract	Color		
cc	3 days	5 days	7 days
5	red	no color	no color
2	violet	red	no color
1	blue	violet	red
0.5	blue	blue	violet
0.2	blue	blue	blue
0.1	blue	blue	blue

A distinct change in color was noticed in the tube where an extract representing .007 g of the mold powder was added to 10 cc of the 2% starch solution and allowed to digest for a week.

It has already been shown that the mold preparation acts much more readily upon soluble starch than upon starch paste. Dextrin is still more readily digested. A specimen of "C. P." dextrin was obtained which gave no color with iodine and no reduction with Fehling's solution, and the action of the mold powder tested upon it. In three days a suspension of 0.1 g mold powder in 20 cc of a 1% solution of this dextrin yielded .1895 g cuprous oxide by Allihn's method. Calculated as dextrose, this would represent a hydrolysis of nearly 40%, or about three times as great as that obtained in the same length of time with soluble starch.

Glycogen, on the other hand, is much less readily attacked than soluble starch or even starch paste. Two-tenths of a gram of glycogen under the same conditions yielded only .0019 g cuprous oxide. There was apparently no diminution in the opalescence of the solution. On repeating the experiment and testing with phenylhydrazine no separation of osazone could be obtained.

The above experiments were all conducted with the preparation of mold that had been obtained from cultures on cane-sugar. To determine the influence of nutrition on the formation of amylase, the method already outlined was followed. Ten cc of a 2% solution of soluble starch were placed in each of a series of tubes, 0.1 g of the mold from the different sources added, and the mixture left in the thermostat for forty-eight hours. An equal volume of alcohol was then added to precipitate the unchanged starch, the precipitation being facilitated by the addition of a little sodium chloride. After filtering, the optical rotation was determined. The solution was then evaporated to remove the alcohol, and the residue taken up in a small volume of water. The iodine test was applied and also the reduction of Fehling's solution.

Source of enzyme	Rotation °Ventzke	Color with I	Fehling's test Cu^2O
Sucrose	4.8	faint blue	+
Sucrose (dried mycelium)	5.0	red	+
Maltose	4.2	violet	+
Lactose	3.8	no color	++
Glucose	4.6	red	+
Starch	4.8	red	+
Inulin	3.9	no color	++
blank	0.4	violet	—

The rotation in this case does not show the relative amount of hydrolysis. This is because the amount of dextrin not precipitated by alcohol at first increases giving an increase in rotation, then the dextrin undergoes hydrolysis and the rotation decreases. It is therefore impossible to determine from the rotation alone whether the latter is increasing or decreasing. But the rotation and the iodine test together afford a satisfactory method of comparison. The mold obtained from the cultures on maltose and more especially on starch show the greatest amylolytic activity. In both of these cases the achromic point has been reached and the reduction of Fehling's solution is stronger than that obtained with the other preparations.

In general it may be said that the amylolytic power of the mycelium of P. camemberti is rather feeble when the organism is cultivated upon cane-sugar. Soluble starch is more readily digested than starch paste, and achroodextrin still more readily, while glycogen is only very slightly hydrolyzed. A more active preparation of amylase may be obtained by introducing starch or maltose into the culture medium in place of the cane sugar.

INULASE

The enzyme powder prepared from cultures of P. camemberti on sucrose had very little action on inulin. When inulin solutions were treated with a suspension of this powder for several days, then freed from the unchanged inulin by alcohol and tested with the phenylhydrazine reagent, only a very slight separation of osazone resulted. This was regarded as evidence of digestion, however, as no separation of osazone could be obtained in the control. Several repetitions of this test gave similar results. Quantitative determinations confirmed the evidence obtained by the phenylhydrazine test. One-tenth of a gram of the mold powder was suspended in 20 cc of a 1% solution of inulin, and the mixture allowed to digest for three days. The amount of cuprous oxide then obtained by Allihn's method, after deducting the blank was .0342 g. This represents .0149 g levulose, or a hydrolysis of about 7%.

The variations in the amount of inulase that might be caused by differences in nutrition were determined in much the same way as in the preceding studies with amylase. Ten cc of a 2% inulin solution were placed in a series of tubes, and 0.1 g of enzyme powder from the various sources was added. After forty-two hours the digestion was stopped and the solutions clarified by shaking with 5 cc alumina cream. Polarimetric determinations were made upon the filtrate, with the following results.

Source of enzyme	Rotation. °Ventzke	Approximate hydrolysis per cent.
Sucrose	-2.6	3
Sucrose (dried mycelium)	-2.8	8
Maltose	-2.6	3
Lactose	-2.6	3
Starch	-2.6	3
Glucose	-2.6	3
Inulin	-5.9	92
Blank	-2.5	0

Here is a striking instance of the influence of nutrition upon enzyme formation. All of the preparations showed some slight activity. But the mold that had been cultivated on inulin as the only source of carbon contained many times as much inulase as those which had been grown on other carbohydrates. The organism evidently adapts itself to the medium, by increasing the amount of the particular enzyme needed.

Inulin as a source of carbon for cultures of P. camemberti gives results similar to those obtained with starch paste and already mentioned. The germination is much delayed and at first only a scanty growth of the organism is obtained. The mold then seems to thrive after it once gets a start, and produces normal fructification, though the mycelium is not as dense as that obtained with cane-sugar or maltose. The complete inversion of the inulin requires more than two weeks, and the levulose is consumed nearly as fast as it is liberated.

In studying the rate of hydrolysis of inulin by the enzyme, the preparation obtained from the culture on inulin was used, as the others possessed so little activity toward inulin. One gram of the powder was extracted in the usual way with thirty times its weight of water, and different amounts of the extract added to 10 cc of a 2% solution of inulin. The total volume was made up to 15 cc. After forty-six hours in the thermostat, the solutions were clarified with 5 cc alumina cream, and the rotation determined.

Mold extract cc	Rotation °Ventzke	Approximate hydrolysis per cent.
5	-46	81
2	-3.6	48
1	-3.0	29
0.5	-2.6	16
0.2	-2.2	3
0.1	-2.1	-
0	-2.1	0

The amount of hydrolysis obtained in a given length of time increases therefore with increase in concentration of the enzyme. As small an amount as 0.2 cc of a 3% extract of the mycelium which had been grown on inulin gives an appreciable hydrolysis with 0.2 g inulin dissolved in 15 cc water.

RAFFINASE

In testing for raffinase the same procedure was followed as described in the preceding experiments. Twently-four hours digestion of raffinose with a suspension of the mold powder yielded reducing sugars which gave a copious precipitate of insoluble osazone. Sugar determinations were made as before, after allowing 20 cc of a 1% raffinose solution to digest for three days with 0.1 g mold powder. The figures are as follows.

Digestion g Cu^2O	Control g Cu^2O	Net increase g Cu^2O
.2438	.0016	.2361
.0061 (mold alone)		

This would represent in terms of monosaccharide a hydrolysis of about 50%.

Varying amounts of a 3% mold extract were added to 10 cc of a 2% raffinose solution and the volume made up to 15 cc. The digestion was carried on for forty-two hours and clarified in the usual way. The polariscope readings are as follows.

Mold extract cc	Rotation °Ventzke
5	4.6
2	5.2
1	5.5
0.5	5.7
0.2	5.8
0.1	5.8
0	5.8

In the complex system resulting from the incomplete hydrolysis of raffinose, the percentage of hydrolysis can hardly be calculated from the rotation. The first stage in the hydrolysis is the liberation of levulose, then further hydrolysis would decompose the remaining disaccharide into dextrose and galactose.

The mold was found to grow readily upon raffinose as the source of carbon, the appearance of the colony being much the same as that obtained with sucrose. As a sufficient quantity of raffinose was not available for the preparation of mold powder from this source, the nutritional experiments were conducted with preparations from other sources.

Sources of enzyme	Rotation °Ventzke	Decrease °Ventzke
Sucrose	5.4	2.5
Sucrose (dried mycelium)	4.8	3.1
Maltose	7.0	0.9
Lactose	3.2	4.7
Starch	6.7	1.2
Glucose	6.8	1.1
Inulin	5.9	2.0
Blank	7.9	—

The decrease in rotation compared with the control shows that the raffinase was present in all of these preparations. The greatest activity was obtained with the mycelium that had grown on lactose, while that grown on sucrose was next in activity. With the other sources of sugar, the activity was considerably less. A significant fact is that both of the sugars which yielded the most raffinase contain two of the hexoses present in raffinose. The greater activity of the lactose preparation may be accounted for by the fact that the disaccharides containing galactose are relatively stable and the enzymes necessary to decompose the intermediary melibiose is increased in amount by the adaptation of the mold to lactose, which is isomeric with melibiose. The relationship between lactase and melibiase is not known, but in view of the fact that lactose and methyl-d-galactoside are apparently hydrolyzed by the same enzyme, there is some ground for supposing that this enzyme may act on other galactosides as well.

SUCRASE

Cane-sugar is an excellent source of carbon for P. camemberti, as well as for other molds of the same and of related genera. Owing to the ease with which it can be procured, and the readiness with which most saprophytic molds grow upon it, this sugar has formed the basis of most of the culture media described. Like other molds which utilize cane-sugar, P. camemberti first inverts it. By following the hydrolysis of the sugar by means of determinations by Allihn's method, it was found that the inversion was complete in six days, after 12% of the sugar had been consumed. From that time on, the sugar disappeared rapidly, until after twelve days no reduction could be obtained. Not until the ninth day was there any appreciable amount of sucrase in the medium; then the amount rapidly increased.

When cane-sugar is hydrolyzed, a molecule each of dextrose and levulose is formed. These two monosaccharides reduce Fehling's solution while the original sucrose does not. The hydrolysis is also accompanied by a change in rotation which will be discussed presently.

Qualitative tests by the usual methods showed at once that sucrase is present in the mold preparation. When a 2% solution of cane-sugar was treated with 1% its weight of mold powder and left in the thermostat for twenty-four hours the resulting solution gave on warming with the phenylhydrazine reagent a copious separation of phenyglucosazone. It gave also a marked decrease in rotation and a strong reduction with Fehling's solution. All of these tests were negative in the control experiments.

Having demonstrated the presence of sucrase, some quantitative determinations were then made. In this series of experiments, as well as in those following, a solution of rock candy was used as it contained no trace of reducing sugar. Five cc of a 2% solution of this sugar were measured out into each of a series of tubes. A definite volume of mold extract, prepared by macerating the mold powder with thirty times its weight of water and filtering, was then added and the total volume made up to 10 cc with distilled water. After forty-eight hours in the thermostat, determinations were made by Allihn's method, the copper being weighed as cuprous oxide. As 5 cc of this extract yielded .0060 g cuprous oxide without the addition of sucrose, the error was calculated in each case and deducted before estimating the percentage of hydrolysis. The results are set forth in the following table.

Mold extract cc	Cuprous oxide g	Invert sugar g	Hydrolysis %
5	.2168	.0990	94.2
2	.2120	.0987	93.9
1	.2068	.0965	92.0
0.5	.1833	.0858	81.7
0.3	.1295	.0607	57.7
0.2	.0825	.0387	36.9
0.1	.0514	.0245	23.4
0.05	.0354	.0173	16.5
0	.0000		
5 cc enzyme alone	.0060		
acid hydrolysis	.2229	.1051	100.0

The rate of hydrolysis except at the upper limits follows the law of Henri.

Similar results were obtained by the use of the polariscope. While the specific rotation of sucrose is 66°5 the dextrose and levulose formed have specific rotations of 52°.7 and -93° respectively, and the rotation of the equimolecular mixture resulting from hydrolysis would therefore be -20°.1. As the rotation in the control experiment is 3°.6 Ventzke, the calculated rotation after complete inversion would be -1°.1 Ventzke. From this the percentage of hydrolysis is estimated in each case. In this experiment varying amounts of a 3% extract of mold (grown on sucrose) were added to 10 cc of a 2% sucrose solution and the total volume made up to 15 cc. The digestion was carried on for twenty-four hours, then the solutions were clarified with 5 cc alumina cream and the optical rotation determined as usual.

Mold extract cc	Rotation °Ventzke	Hydrolysis %
5	-1.1	100
2	0.0	77
1	1.5	45
0.5	2.4	25
0.2	3.2	9
0.1	3.4	4
0	3.6	0

To determine whether P. camemberti produces sucrase when other carbohydrates than sucrose have served as the source of carbon, mold preparations from different sources were used exactly as described under inulase and raffinase, and the rotation measured after twenty-four hours.

Sources of enzyme	Rotation °Ventzke	Hydrolysis %
Sucrose	-1.0	100
Sucrose (dried mycelium)	-1.0	100
Maltose	-0.4	25
Lactose	-1.0	100
Glucose	0.1	74
Starch paste	0.2	71
Inulin	0.2	71
Blank	3.2	0

The rotation after complete hydrolysis in this experiment would be -1°.0 Ventzke, and from this the percentages of hydrolysis are calculated. It is evident from the table that sucrase is formed no matter which of the carbohydrates has served as the source of carbon in the culture medium. Yet sucrase is known to be a specific enzyme. The highest result was obtained with the mold that had been cultivated on sucrose and lactose. The differences are by no means as great as those obtained in the experiments with inulase.

MALTASE

The presence of maltase in the mold powder was first ascertained qualitatively by the phenylhydrazine test. A 1% solution of maltose was treated for twenty-four hours with one-twentieth its weight of mold powder, and an abundant precipitate of phenylglucosazone obtained by the usual test. This indicates a fairly active maltase. A quantitative determination by Allihn's method established this fact beyond doubt. In this experiment 20 cc of a 1% solution of maltose was treated for a week with 0.1 g mold powder. At the end of that time the amount of cuprous oxide obtained was .3504 g, while the control gave .2274 g. As .2274 g cuprous oxide represents .1779 g anhydrous maltose, and this on complete hydrolysis would yield .3805 g cuprous oxide, the hydrolysis may be taken as about 90%.

In determining the relative activity of different amounts of enzyme, the mold that had been cultivated on maltose was used. The experiment was conducted as usual, the time of digestion in this case being twenty-nine hours. Ten cc of a 2% maltose solution were used, and diluted to 20 cc before polarizing. On complete hydrolysis of maltose, the specific rotation decreases from 138° to 52°.7. In the following experiment, the maltose solution before inversion had a rotation of 7°.1 Ventzke, and the rotation after complete hydrolysis would therefore be 2°.7 Ventzke.

Mold extract cc	Rotation °Ventzke	Hydrolysis %
5	4.6	56
2	5.2	43
1	6.0	20
0.5	6.6	9
0.2	7.0	2
0.1	7.1	—
0	7.1	—

As in the preceding experiments with other enzymes, the influence of nutrition on the formation of enzyme was determined The experiments were conducted as before, using a 2% solution of maltose, and allowing the digestion to go on for forty-two hours. The following table shows the relation between the nutrient carbohydate and the maltose-splitting enzyme.

Source of Enzyme	Rotation °Ventzke	Hydrolysis %
Sucrose	8.7	18
Sucrose (dried mycelium)	8.4	23
Maltose	6.8	50
Lactose	8.6	20
Starch	6.6	53
Glucose	7.0	47
Inulin	8.9	15
Blank	9.8	—
Calculated for complete hydrolysis	3.8	100

Maltase is evidently present in all of these preparations. The carbohydrates which favor its formation are starch and maltose.

LACTASE

The action of the mold powder on lactose is very slight indeed. The phenylhydrazine test which was first applied showed no evidence at all of digestion. On treating a 1% solution of lactose with one-twentieth its weight of mold powder, no separation of glucosazone could be obtained by the usual procedure. On the contrary, the solution on cooling yielded characteristic crystals of phenyllactosazone. Determinations by Allihn's method showed, however, a very slight increase in reducing power. Twenty cc of a 1% lactose solution were taken and 0.1 g mold powder added. After three days in the thermostat the reducing power was determined. Two experiments in which lactose from different sources was used gave the following figures.

Lactose plus enzyme g Cu^2O	Lactose alone g Cu^2O	Net increase g Cu^2O
.3054	.2923	.0071
.2979	.2852	.0067

Enzyme alone .0060.

The hydrolysis is approximately 1%.

The increase in rotation after inversion of lactose is so slight that a conversion of 1% could not be demonstrated in this way. If a 2% solution of lactose were used and the polarimetric readings made in the usual way, a change in rotation of 0°.1 Ventzke would represent a hydrolysis of about 10%. Obviously the error is too great for this method to be applicable. Polarimetric determinations with lactose and enzyme from different sources showed no appreciable increase within the limit of error.

The organism was found to grow fairly well upon media containing lactose, and the mold powder used in some of the preceding experiments showed that the enzymes obtained from the lactose-fed mycelium were in most cases as active as those obtained from sucrose. The activity toward lactose, however, was found to be greater. An experiment was conducted in exactly the same manner as those described above, and the reducing power determined as before.

Lactose plus enzyme g Cu^2O	Lactose alone g Cu^2O	Net increase g Cu^2O
.3251	.2883	.0308

The amount of lactase present in the mycelium grown on lactose is therefore about four times as great as that present in the mycelium cultivated on sucrose. The very small amount of lactase formed under these conditions is not surprising. This enzyme is the least abundant of the three inverting enzymes in either the vegetable or the animal kingdom. While ordinary yeast inverts sucrose and maltose, it is without action on lactose. Repeated attempts to find lactase in certain animal tissues have also resulted in failure.

SUMMARY

By using pure cultures of a definitely identified mold and cultivating it under known conditions, the writer has endeavored to study the nature of the intracellular enzymes produced and the conditions favoring their formation. For various reasons Penicillium camemberti was found to be especially well adapted to such studies.

When P. camemberti is cultivated on a medium containing sucrose as the only source of carbon, and sodium nitrate as the only source of nitrogen, a considerable number of enzymes are produced. They are retained for the most part by the mycelium until the time of fructification. By treating the mycelium with acetone and ether, a dry powder results which contains the enzymes in such form that they retain their activity indefinitely.

The powder prepared in this way was found to contain the following enzymes:—*erepsin, nuclease, amidase, lipase, emulsin, amylase, inulase, raffinase, sucrase, maltase and lactase.* The lipase, inulase and lactase were, however, quite feeble when the organism was grown on the cane-sugar medium.

The protease behaves exactly like Conheim's erepsin, exeept that its activity is greatest in neutral media or media faintly acid with acid phosphates. It digests casein, gelatin and proteoses (Witte-peptone), yielding a large percentage of amino acids, but does not attack native proteins to any appreciable extent.

The formation of erepsin is independent of the presence of protein or protein derivatives in the culture medium. An active erepsin is obtained when the organism is cultivated on a solution containing cane-sugar and sodium nitrate as the only source of carbon and nitrogen.

A nuclease, liberating purines and phosphoric acid from yeast nucleic acid, is obtained independently of the presence of nuleic acid or organic nitrogen compounds in the culture fluid.

An amidase, or perhaps a group of amidases, is present which liberates ammonia from urea, asparagine, benzamide and alanine.

An enzyme decomposing hippuric acid into benzoic acid and glycocoll is present in a very active form.

The carbohydrate-splitting enzymes, amylase, inulase, raffinase, sucrase, maltase and lactase, are formed no matter which of the corresponding carbohydrates has served as the source of carbon in the culture medium. The amount of enzyme, which in some cases is quite small, may be materially increased by cultivating the organism on the corresponding carbohydrate. This is particularly true of inulase, amylase and lactase, which ordinarily occur only in a very small amount.

There is no evidence that enzymes not normally formed by the organism in demonstrable quantities can be developed by special methods of nutrition. The influence of adding a particular substratum to the medium is therefore to stimulate the production of the corresponding enzyme, which is normally formed under all conditions; not to develop an entirely new enzyme.

By extending the application of this principle of regulatory formation of enzyme, the author hopes to be able to obtain more active preparations of lipase, nuclease, amidase and other enzymes.

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of the more important contributions to the chemistry and the enzymatic activities of Penicillium and Aspergillus.

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General Weather Review.

1907.

BY W. M. ESTEN.

Latitude 41° 48′, longitude 72° 15′, elevation 640 feet.

Observations have been taken for the past nineteen years. The data of each succeeding year added to the previous total data, give a more valuable and correct average of the climate in this locality.

TEMPERATURE.

The mean temperature for the year was 46.43°, only .37° below the average. The mean for the state was 47°. The temperature for the first half of January was above the normal. After the 15th, the weather was much below the normal, which condition extended through February with a mean temperature of 19°, which was 6.2° below the normal. The weather for March was much milder than usual. The mean temperature was 3.2° above the average. During the latter part of the month maximum temperatures of 75° and 80° were recorded on the 28th and 29th. The weather during the month of April, with a low temperature and a heavy snowfall, was more like March weather. The temperature was the lowest for the past 18 years, 3.6° below the normal. May was an unusually cold month with a temperature of 4.9° below the normal average. The warm days characteristic of May, were markedly absent. June, July and August were all below the normal in temperatures. The latter part of June was much warmer and had more sunshine than usual, but the average for the month was about 3° below the normal. The four last months of the year were much warmer than the average. The year ended with a December temperature of 4.3° above the average, accompanied with many bright sunshiny days.

RAINFALL

The total amount of rainfall for the year, 42.76 inches, was 3.42 inches less than the average for the past nineteen years. June on the average has 2.95 inches, or the least rainfall of any month, while July with 4.65 inches, has the greatest average amount. The first eight months of 1907 had a very low rainfall. January precipitation was about one inch below the average. February was .37 inch was the lowest since the records have been kept at Storrs. March and July had only about 1.5 inches, the two months which normally have the most rainfall. August had only 1.09 inches of rain, while September had 9.61 inches and November 6.81. Both October and December had more than the average amount. The cold spring and dry July and August prevented crops from maturing, especially corn, which in some localities was almost a failure.

GROWING SEASON

The growing season commenced at the last killing frost on May 24th and extended to the first killing frost on October 9th, a period of 137 days, 10 days less than the average of 147 days. The last and first killing frosts were from 17 to 7 days respectively later than they commonly occur.

TABLE NO. 31.

Meteorlogical Observations for 1907.

Temperature	January	February	March	April	May	June	July	August	September	October	November	December	Total	Average
Highest	59	46	80	70	85	87	89	94	83	69	62	58		73. 5
Lowest	-13	-8	8	21	27	35	48	45	35	26	19	15		22. 3
Mean	25.4	19.0	35.8	41.4	50.7	62.0	71.6	65.9	61.9	49.4	40.21	33.8		46.43
Total precipitation, inches	3.13	.37	1.68	2.40	3.16	2.81	1.45	1.09	. 1	4.97	6.81	5.28	42.76	3.56
No. days with .01 inch or more precipitation.	7	4	8	7	8	8	6	4	11	5	9	8	85	7
Growing Season	May 24 to Oct. 9th. 187 days, 10 days less than the average.													

TABLE No. 32.

Monthly mean temperature for past 19 *years.*

YEAR	January	February	March	April	May	June	July	August	September	October	November	December	Annual Mean
1888	——	——	——	——	——	65.3	66 4	67.3	57.1	43.8	39.7	30.0	——
1889	30.8	22.1	34.9	45.6	58.4	65.2	67.9	64.8	59.7	45.8	40.9	35.1	47.6
1890	32.0	31.7	30.8	44.7	54.9	63.3	67.5	66.0	59.5	47.6	37.9	23.4	46.6
1891	28.8	29.3	31.9	46.1	54.1	63.9	55.2	68.4	63.7	48.3	38.2	37.0	47.9
1892	25.5	26.9	29.9	41.9	53.6	67.0	69.2	67.4	59.1	48.5	37.6	25.5	46.8
1893	17.3	23.5	30.3	42.0	54.5	64.2	67.9	68.0	55.9	51.7	38.1	27.8	45.1
1894	27.7	23.0	38.6	44.7	56.4	66.0	70.9	65.8	63 0	50.6	34.1	28.2	47.4
1895	24.4	19.9	31.1	44.1	57.3	66.6	66.1	68.8	63.1	45.0	41.7	32.6	46.7
1896	21.8	26.3	28.5	47.5	59.9	63.2	69.6	68.5	59.9	47.2	43.5	26.8	46.9
1897	25.0	27.0	34.0	46.0	56.0	62.0	69.0	66.0	60.0	51.0	39.0	31 0	47.2
1898	25.0	28.0	40 0	42.0	54.0	64.0	70.0	69.0	63.0	52.0	38.0	29.0	47.8
1899	25.0	22.0	31.0	45.0	56.0	67.0	68.0	67.0	59.0	52.0	39.0	31.0	46.8
1900	27.0	26.0	30.0	46.0	55.0	66.0	71.0	69.0	64.0	54.0	41.0	29.0	48.2
1901	25.0	16.0	33.0	45.0	54.0	67.0	71.0	66.0	62 0	50.0	33.0	29.0	46 2
1902	24.0	25.0	41.0	46.0	55.0	64.0	66.0	64.0	59.0	48.0	44.0	23.0	46.8
1903	26.0	27.8	43.1	45.9	58.8	59.3	68.0	61.7	60.8	51.1	35 8	23.3	46.8
1904	18.0	18.6	34.1	42.9	59.7	63.4	68 7	65.9	59.9	48.1	35.6	22.4	44.8
1905	20.5	19.3	34.1	44.8	57.0	64.0	71 5	66.0	59.7	53.6	38.0	32.5	46.8
1906	31.9	26.9	28.9	45.9	56.7	65.3	69.8	70.5	63.6	52.2	39.6	26.4	48.1
Average.....	25.3	24.5	33.6	45.5	56.2	64.5	68.6	66.9	60.6	49.5	38.6	28.5	46.8

TABLE NO. 33.

Total monthly precipitation for past 19 *years.*

YEAR	January	February	March	April	May	June	July	August	September	October	November	December	Annual Precipitation.
1888	—	—	—	—	—	2.10	1.93	4.97	8.45	6.85	4.94	5.28	—
1889	4.03	1.64	1.96	3.49	2.16	3.50	11.39	3.78	4.00	5.52	5.91	2.88	50.26
1890	2.66	3.28	6.12	3.15	6.33	2.79	2.81	4.26	7.19	5.25	.82	4.21	48.87
1891	3.52	5.64	4.42	3.51	2.50	1.84	4.96	3.95	4.08	4.14	3.09	4.96	51.61
1892	4.91	1.60	3.00	.70	5.60	2.77	3.25	5.20	1.40	1.09	5.41	1.35	36.28
1893	2.39	5.88	4.67	3.82	7.12	1.98	1.58	3.79	2 58	6.71	2.45	3.68	46.65
1894	2.24	3.13	1.18	2.67	3.58	.59	2.09	2.37	3.01	4.16	4.00	4.31	33.33
1895	5.78	.63	2.62	4.27	2.16	1.78	4.13	3.48	2.97	6.74	6.97	4.12	45.65
1896	1.60	7.10	4.86	.80	2.72	1.78	3.22	2.71	7.03	3.60	2.49	2.67	40.58
1897	3.84	3.40	3.66	2.37	4.44	2.79	12.24	5.23	1.39	.92	7.14	5.61	53.08
1898	4.70	4.03	3.09	4.44	3.81	2.48	6.24	5.87	2.22	6.18	6.11	1.96	51.13
1899	3.76	3.97	5.58	2.20	1.17	3.72	5.55	3.27	3.31	1.54	2.10	2.14	38.31
1900	3.42	7.31	6.43	2.67	4.91	4.82	2.76	2.03	2.27	3.21	6.79	2.22	48.64
1901	3.50	1.05	7.18	9.51	6.80	1.96	5.54	7.58	4.88	1.97	3.04	9.55	66.51
1902	2.53	5.11	6.85	3.81	1.78	3.25	7.48	2.17	7.05	5.68	1.10	5.86	52.12
1903	3.73	5.18	7.09	2.81	.50	9.24	4.56	4.52	1.81	2.79	1.95	4.27	48.45
1904	4.55	2.80	3.31	6.40	1.96	2.53	1.85	6.00	4.71	2.19	1.47	2.42	40.19
1905	3.57	1.21	3.45	2.87	.90	4.58	1.77	2.63	5.79	2.57	2.73	4.12	36.14
1906	3.16	2.68	5.46	4.40	5.87	2.18	5.03	2.16	2.65	4.85	2.39	2.80	43.63
Average....	4.10	3.59	4.46	3.55	3.54	2.95	4.65	3.99	4·01	3.97	3.73	3.91	46.18

TABLE NO. 34.

Growing season for past 19 *years.*

YEAR	Last Killing Frost, Spring	First Killing Frost, Fall	Length of Growing Season
1888	May 16	September 7	114 days
1889	May 4	September 23	142 "
1890	April 29	September 25	148 "
1891	May 5	October 17	164 "
1892	April 30	September 21	144 "
1893	May 8	October 17	161 "
1894	May 15	September 26	134 "
1895	May 17	October 15	150 "
1896	May 2	September 24	144 "
1897	April 22	September 28	159 "
1898	May 10	October 17	160 "
1899	May 4	September 15	134 "
1900	May 11	October 18	158 "
1901	May 6	September 26	142 "
1902	May 28	October 10	135 "
1903	May 3	October 15	165 "
1904	April 24	September 22	150 "
1905	April 23	September 27	156 "
1906	May 11	October 12	154 "
Average....			148 days

TABLE 35.

Rainfall during growing season, May 1 to October 31, 1907.

Locality	Observer	Inches per month.						Total
		May	June	July	August	September	October	
Bridgeport	Wm. Jennings	3.70	3.02	1.90	1.36	8.04	5.03	23.05
Canton	G. J. Case	3.91	4.18	1.45	1.37	10.50	6.91	28.32
Colchester	S. P. Willard	3.61	2.67	1.70	1.33	5.20	5.44	19.95
Cream Hill	C. L. Gold	4.42	4.23	2.10	2.11	12.22	9.69	34.77
Danielson	F. E. Bitgood	1.91	3.10	2.55	2.20	11.23	6.97	27.96
Hartford	U. S. Weather Bureau	3.35	3.44	1.86	1.03	11.56	4.53	25.77
Hawleyville	E. N. Hawley	5.95	4.91	2.13	1.73	9.68	6.67	31.07
New Haven	U. S. Weather Bureau	4.42	3.18	1.10	1.21	7.67	4.85	22.43
New London	T. C. Dillon	4.05	3.06	1.90	0.99	5.93	4.74	20.67
No. Grosv'nor Dale	Grosvenor Dale Co.	2.95	3.04	1.30	0.84	8.71	5.05	21.89
Norwalk	G. C. Comstock	4.46	3.56	1.29	1.48	5.98	5.38	22.15
Southington	L. Andrews	3.15	3.55	1.15	1.18	11.90	5.30	26.23
Storrs	Agr. Exper. Station	3.16	2.81	1.45	1.09	9.71	4.97	23.19
Torrington	Prof. E. H. Forbes	4.49	3.40	2.16	4.64	9.84	7.71	32.24
Voluntown	Rev. E. Dewhurst	4.89	2.15	1.05	1.17	6.81	3.97	20.04
Waterbury	N. J. Welton	3.87	4.37	2.29	1.35	9.82	5.89	27.59
Average		3.89	3.42	1.71	1.57	9.05	5.82	25.46

TABLE NO. 36.

Summary of rainfall for growing season, May 1 *to October* 31, *for twenty places in Connecticut for past* 18 *years.*

Year	Highest	Place of Occurrence	Lowest	Place of Occurrence	Average of Twenty Localities
1889	37.38	New Haven	28.64	N. Woodstock....	32.41
1890	31.87	Canton	24.89	New London	29.07
1891	23.11	Franklin	14.91	Waterbury	19.59
1892	29.06	Falls Village....	14.12	N. Franklin.....	19.67
1893	28.70	Oxford	18.31	New London	24.32
1894	24.35	New Hartford....	15.69	Lake Konomoc..	19.79
1895	25.66	Voluntown	17.01	Newington	21.63
1896	26.19	Falls Village....	16.99	New London	22.30
1897	39.78	Southington.....	23.46	New London	30.84
1898	34.88	Voluntown	23.87	Winchester......	29.54
1899	25.69	Canton	15.04	New Haven......	19.34
1900	31.08	Falls Village	12.40	New Haven... ..	19.65
1901	33.11	Waterbury	16.20	New London	27.80
1902	35.40	Cream Hill,.....	17.23	New London.....	27.21
1903	34.45	Hawleyville.....	16.13	New London.....	25.78
1904	28.47	Cream Hill	17.04	New London.....	22.93
1905	31.55	Bridgeport	17.75	So. Manchester..	21.89
1906	30.34	New London	19.43	Danielson	24.93
Avg.	30.61		18.28		24.37

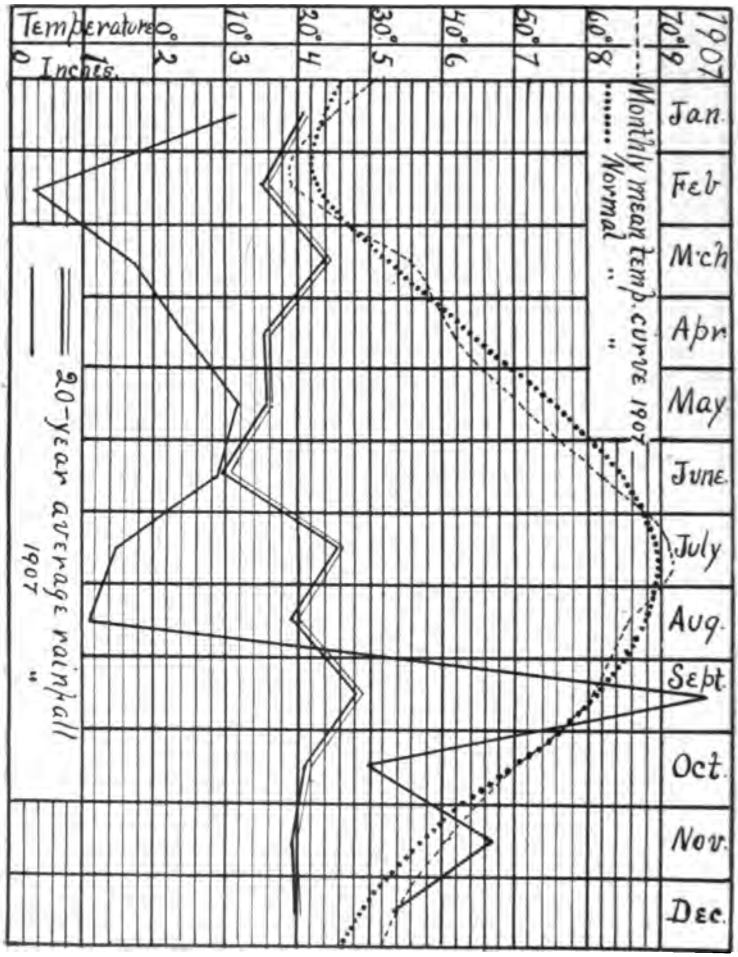
Temperature 0°
0 Inches.
2
10° 3
20° 4
30° 5
40° 6
50° 7
60° 8
70° 9
1907
Jan.
Feb.
M'ch
Apr.
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.
Monthly mean temp. curve 1907
Normal " " "
20-year average rainfall
1907 " "

TABLE No. 87.

TABLE No. 38.

Grand Summary for 19 years at Storrs.

Temperature	Amount	Date	
Mean	46.8°		
Highest	96°	July 5	1898
Lowest	—13.3°	February 17	1896
Highest annual mean	48.2°		1900
Lowest annual mean	44.8°		1904
Range of	109°		
Greatest daily range of	46°	December 23	1902
Range of annual mean	3.4°		
RAINFALL			
Mean	46.97 in.		
Greatest annual	66.51 "		1901
Least annual	33.33 "		1894
Greatest monthly	12.24 "	July	1897
Least monthly	.37 "	February	1907
Greatest daily	4.26 "	June 21	1903
GROWING SEASON			
Longest duration of	165 days	May 3 to Oct. 15	1903
Shortest duration of	114 "	May 16 to Sept. 7	1888
Average date of last killing frost in spring		May 7	
Average date of first killing frost in autumn		October 2	
Prevailing wind	Jan., Feb., March, April, Aug., Oct., Nov., Dec.,...		N. W.
Prevailing wind	May, June, July, Sept.,...		S. W.
	For the year		N. W.

No changes have occurred in the grand summary except the least monthly precipitation from .50 inch in May, 1903, to .37 inch in February, 1907.

General Weather Review

1908

By W. M. Esten.

Latitude 41° 48′, longitude 72° 15′, elevation 640 feet.

Observations have been taken for the past twenty years.

The present report is somewhat more significant than previous ones on account of its being the 20th year of observations taken at the station. The weather station at Storrs is called the co-operative observer and display station. The records of the weather are not sent in for daily forecasts but are sent by months to the New England center at Boston, to make up the monthly climatological reports which are published and distributed.

Table 39.

Data on 20 year average mean temperatures.

Month	Temp. 1st day	Last day	Change of	Rate of Change Daily
January	26.5	22.5	− 4.	Decrease, .13
February	22.5	27	+ 4.5	Increase, .16
March	27	38	+11	" .35
April	38	49.6	+11.6	" .39
May	49.6	60	+10.4	" .33
June	60	67.2	+ 7.2	" .23
July	67.2	69	+ 1.8	" .05
August	69	64.6	− 4.4	Decrease, .14
September	64.6	56.	− 8.6	" .29
October	56	43.6	−12.4	" .40
November	43.6	32.8	−10.8	" .36
December	32.8	26.5	− 6.3	" .20

Warmest month, July, 68.7; coldest month, February, 24.2. Warmest day, July 24th, 69.5; coldest day, February 5th, 22.5.

Mean temperature below 32°, 102 days, December 3 to March 16th; daily range of temperature, greatest, 20°, June, July and August; daily range of temperature, least, 17°, January, February and March.

GENERAL TEMPERATURE FOR 20-YEAR PERIOD.

From the 20-year records have been drawn 3 curves representing the 20-year mean maximum, 20-year mean minimum and 20-year mean for every day in the year. These curves illustrate the changes of mean temperature from the lowest point of 22½° on February 5th to the highest point 69.5° on July 24th, with the rate of increase and decrease of temperature for each month. The method of getting these values was to take, for example, the 1st day of January of each year, of which there are 20, add together the highest temperature of each of these 20 days and divide the same by 20. This gives the mean maximum temperature for the 1st of January at Storrs. The mean minimum is obtained in the same way. Half the sum of the mean maximum and mean minimum gives the mean temperature for this date. The mean temperature for the 1st of January is found to be 25.6°. This is the normal temperature for the 1st of January. Our variable and changeable condition of weather changes this value for any one year. The temperature may be 20° to 30° colder or warmer then the normal. It is found that the mean temperature is below freezing 102 days in a year from December 3rd to March 16th.

From the table it is noted that July and January are the two months in which the temperature changes the least, while in April and October the rate of change of temperature is the greatest. The rate of change in October is the maximum of all the months. The normal curve of mean temperatures shows some interesting variations. January 20th to 25th shows a marked tendency to be about 8 degrees warmer than normal. February 3rd to 6th is a cold period, about 4° below normal. March has two warm and two cold periods. The cold periods are 2nd to 7th, 13th to 17th; the warm periods 7th to 13th and 17th to 27. April has a warm period from 1st to 3rd and a cold period from 27th to 29th. The other parts of the month keep near the normal. May temperatures are below normal, 3d to 5th and 18th to 30th. From 5th to 18th, it is above the normal.

June has 3 periods below and 3 above normal. Those below are 6th to 9th, 16th to 20th, 24th to 28th. The warm periods are 2nd to 6th, 9th to 16th, 20th to 24th. July shows no very marked variation, though a tendency to warmer weather than normal from 7th to 21st; cooler than normal from 22nd to 29th. August and the first half of September include 45 days of weather which are more uniform and keep more nearly to the normal than any other periods of the year. The famous "Indian summer" weather is justified by the 20-year temperature curve. The periods it is most likely to occur on are October 14th to 21st; October 24th to November 10th, and November 14th to 25th. The December temperatures are all below normal, except from 20th to 25th and 28th to 30th.

TEMPERATURE 1908.

The mean temperature for the year was 48.50°, 2.1° above the average. The mean temperature for the state was 49.40°. The temperature for the year was considerably above the normal. June, July and October were much above the normal in temperature. January was warmer than usual by 2.5°. The end of the month was very cold with little or no snow on the ground.

The first ten days of February were very cold. The coldest day was the 5th, which is normally the coldest day according to the 20-year average. The average temperature for the month was .5° above the normal. A light covering of snow was on the ground at the end of the month. March varied only 2° from normal.. April was 1.8° above the normal. May was very warm, 3.3° above normal, a variation not often observed. The warm weather commencing in May continued through June and July. June was 2.3° and July 2.9° above the normal. August was only .2° less than normal. September was 2.8° above normal. October was the maximum month for high mean temperature which was 5.5° above the normal. November and December were normal in temperature.

RAINFALL.

The total amount for the year of 41.98 inches was 4.02 less than the average for the past 20 years. For the last 3 years the rainfall has been from 3 to 4 inches less than the normal average. This diminished rainfall may have some relation to deforestation and brings us to the question of considering the feasibility of national forest preservation.

The amount of rainfall for January was a little less than normal. February had nearly twice as much rain as usual. The year previous, February had the least for 20 years. April was very deficient in rain. May, July and August had excessive amounts, averaging nearly 6 inches for each month. June had its usual amount. September, October and November were unusually deficient. November was the lowest with only .80 inch. December had a trifle more than usual.

GROWING SEASON.

The growing season was the longest on record. It commenced on April 23rd and closed on October 13th, a period of 173 days, 8 days above the former record of 165 days in 1903. The growing season is determined by the last and first killing frosts of the year. A killing frost is one where the temperature of the air falls below 32°. In the locality were it occurs, it means a little more than occasional and local frosts. It is what might be termed the first freeze which kills all plants subject to destruction by frost. Not only a very thin layer of air near the ground is below 32° but the air temperature for some distance above the earth is below 32°. All kinds of plants made a good growth and crops were matured in good season.

TABLE NO. 40.

Meteorological Observations for 1908.

Temperature	January	February	March	April	May	June	July	August	September	October	November	December	Total	Average
Highest	53	56	73	84	84	87	92	86	86	89	60	66		76
Lowest	−7	−7	11	21	36	37	49	40	38	25	19	7		22
Mean	27.7	24.7	33.9	47.0	59.2	65.6	71.6	66.6	63.4	54.9	37.5	29.6		48.58
Total precipitation in inches	3.26	5.20	3.94	1.56	6.54	2.42	5.37	5.91	1.45	1.84	0.80	3.69	41 98	3.50
Number of days with .01 inch or more precipitation	8	8	8	5	5	4	5	6	2	4	3	6	64	5
Growing Season	from April 23 to October 18th, 173 days, the longest period in 20 years.													

TABLE NO. 41.

Monthly mean temperature for past 20 years.

Year	January	February	March	April	May	June	July	August	September	October	November	December	Annual Mean
1888	——	——	——	——	——	65.3	66.4	67.3	57.1	43.8	39.7	30.0	——
1889	30.8	22.1	34.9	45.6	58.4	65.2	67.9	64.8	59.7	45.8	40.9	35.1	47.6
1890	32.0	31.7	30.8	44.7	54.9	63.3	67.5	66.0	59.5	47.6	37.9	23.4	46.6
1891	28.8	29.3	31.9	46.1	54.1	63.9	55.2	68.4	63.7	48.3	38.2	37.0	47.9
1892	25.5	26.9	29.9	44.9	53.6	67.0	69.2	67.4	59.1	48.5	37.6	25.5	46.3
1893	17.3	23.5	30.3	42.0	54.5	64.2	67.9	68.0	55.9	51.7	38.1	27.8	45.1
1894	27.7	23.0	33.6	44.7	56.4	66.0	70.9	65.8	63.0	50.6	34.1	28.2	47.4
1895	24.4	19.9	31.1	44.1	57.3	66.6	66.1	68.3	63.1	45.0	41.7	32.6	46.7
1896	21.8	26.3	28.5	47.5	59.9	63.2	69.6	68.5	59.9	47.2	43.5	26.8	46.9
1897	25.0	27.0	34.0	46.0	56.0	62.0	69.0	66.0	60.0	51.0	39.0	31.0	47.2
1898	25.0	28.0	40.0	42.0	54.0	64.0	70.0	69.0	63.0	52.0	38.0	29.0	47.8
1899	25.0	22.0	31.0	45.0	56.0	67.0	68.0	67.0	59.0	52.0	39.0	31.0	46.8
1900	27.0	26.0	30.0	46.0	55.0	66.0	71.0	69.0	64.0	54.0	41.0	29.0	48.2
1901	25.0	19.0	33.0	45.0	54.0	67.0	71.0	66.0	62.0	50.0	33.0	29.0	46.2
1902	24.0	25.0	41.0	46.0	55.0	64.0	66.0	66.0	59.0	48.0	44.0	23.0	46.8
1903	26.0	27.8	43.1	45.9	58.8	59.3	68.0	61.7	60.8	51.1	35.8	23.3	46.8
1904	18.0	18.6	34.1	42.9	59.7	63.4	68.7	65.9	59.9	48.1	35.6	22.4	44.8
1905	20.5	19.3	34.1	44.8	57.0	64.0	71.5	66.0	59.7	53.6	38.0	32.5	46.8
1906	31.9	26.9	28.9	45.9	56.7	65.3	69.8	70.5	63.6	52.2	39.6	26.4	48.1
1907	25.4	19.0	35.8	41.4	50.7	62.0	71.6	65.9	61.9	49.4	40.2	33.8	46.4
Average....	25.3	24.2	33.7	45.2	55.9	64.4	68.7	66.8	60.6	49.4	38.7	28.8	46.4

TABLE NO. 42.

Total monthly precipitation for past 20 years.

YEAR	January	February	March	April	May	June	July	August	September	October	November	December	Annual Precipitation.
1888	—	—	—	—	—	2.10	1.98	4.97	8.45	6.35	4.94	5.28	—
1889	4.03	1.64	1.96	3.49	2.16	3.50	11.39	3.78	4.00	5.52	5.91	2.88	50.26
1890	2.66	3.28	6.12	3.15	6.33	2.79	2.81	4.26	7.19	5.25	.82	4.21	48.87
1891	8.52	5.64	4.42	3.51	2.50	1.84	4.96	3.95	4.08	4.14	3.09	4.96	51.61
1892	4.91	1.60	3.00	.70	5.60	2.77	3.25	5.20	1.40	1.09	5.41	1.35	36.28
1893	2.39	5.88	4.67	3.82	7.12	1.98	1.58	3.79	2.58	6.71	2.45	3.68	46.65
1894	2.24	3.13	1.18	2.67	3.58	.59	2.09	2.37	3.01	4.16	4.00	4.31	33.33
1895	5.78	.63	2.62	4.27	2.16	1.78	4.13	3.48	2.97	6.74	6.97	4.12	45.65
1896	1.60	7.10	4.86	.80	2.72	1.78	3.22	2.71	7.03	3.60	2.49	2.67	40.58
1897	3.84	3.40	3.66	2.37	4.44	2.79	12.24	5.23	1.39	.92	7.14	5.61	53.03
1898	4.70	4.03	3.09	4.44	3.81	2.48	6.24	5.87	2.22	6.18	6.11	1.96	51.13
1899	3.76	3.97	5.58	2.20	1.17	3.72	5.55	3.27	3.31	1.54	2.10	2.14	38.31
1900	3.42	7.31	6.43	2.67	4.91	4.32	2.76	2.03	2.27	3.21	6.79	2.22	48.64
1901	8.50	1.05	7.18	9.51	6.30	1.96	5.54	7.58	4.33	1.97	3.04	9.55	66.51
1902	2.53	5.11	6.35	3.81	1.73	3.25	7.48	2.17	7.05	5.68	1.10	5.86	52.12
1903	3.73	5.18	7.09	2.81	.50	9.24	4.56	4.52	1.81	2.79	1.95	4.27	48.45
1904	4.55	2.80	3.31	6.40	1.96	2.53	1.85	6.00	4.71	2.19	1.47	2.42	40.19
1905	3.57	1.21	3.45	2.87	.90	4.53	1.77	2.63	5.79	2.57	2.73	4.12	36.14
1906	3.16	2.68	5.46	4.40	5.87	2.18	5.03	2.16	2.65	4.85	2.39	2.80	43.63
1907	3.18	.87	1.63	2.40	3.16	2.81	1.45	1.09	9.61	4.97	6.81	5.28	42.76
Average	4.05	3.47	4.32	3.48	3.52	2.94	4.49	3.85	4.79	4 02	3.88	3.98	46.00

TABLE No. 43.

Growing season for past 20 years.

YEAR.	Last Killing Frost, Spring	First Killing Frost, Fall	Growing Season
1888	May 16	September 7	114 days
1889	May 4	September 23	142 “
1890	April 29	September 25	148 “
1891	May 5	October 17	164 “
1892	April 30	September 21	144 “
1893	May 8	October 17	161 “
1894	May 15	September 26	134 “
1895	May 17	October 15	150 “
1896	May 2	September 24	144 “
1897	April 22	September 28	159 “
1898	May 10	October 17	160 “
1899	May 4	September 15	134 “
1900	May 11	October 18	158 “
1901	May 6	September 26	142 “
1902	May 28	October 10	135 “
1903	May 3	October 15	165 “
1904	April 24	September 22	150 “
1905	April 23	September 27	156 “
1906	May 11	October 12	154 “
1907	May 24	October 9	137 “
Average			147 days

TABLE No. 44.

Rainfall during growing season, May 1 *to October* 31, 1908.

Locality	Observer	Inches Per Month						Total
		May	June	July	August	September	October	
Bridgeport	Wm. Jennings	6.25	0.71	5.13	9.32	1.01	1.54	23.96
Canton	G. J. Case	5.69	2.16	3.87	3.03	1.62	2.34	18.71
Colchester	S. P. Willard	6.31	1.98	5.32	6.30	1.64	2.20	23.75
Cream Hill	C. L. Gold	4.20	2.45	6.65	5.29	1.30	1.99	21.88
Danielson	F. E. Bitgood	3.68	2.82	3.51	5.70	1.32	2.00	19.03
Hartford	U.S. Weather Bureau	6.52	2.42	5.74	6.74	1.12	1.67	24.21
Hawleyville	E. N. Hawley	7.16	1.58	2.44	6.25	1.59	2.02	21.04
New Haven	U. S. Weather Bureau	6.16	1.20	3.94	8.12	0.88	1.58	21.88
New London	T. C. Dillon	4.09	1.82	3.11	7.82	1.57	3.76	22.17
No. Grosvenor Dale	Grosvenor Dale Co.	2.77	2.31	4.26	7.70	1.03	1.48	19.55
Norwalk	G. C. Comstock	6.67	0.56	6.90	11.38	0.98	1.27	27.76
Southington	L. Andrews	7.40	1.20	4.65	7.10	1.40	2.15	23.90
Storrs	Agr. Experiment Sta.	6.54	2.42	5.37	5.91	1.45	1.84	23.53
Torrington	Prof. E. H. Forbes	4.65	2.14	4.01	——	1.78	1.52	——
Voluntown	Rev. E. Dewhurst	4.49	2.68	3.90	5.91	1.18	2.63	20.79
Waterbury	N. J Welton	5.85	1.10	6.53	6.53	1.39	2.43	23.83
Average		5.5	1.85	4.70	6.87	1.33	2.03	22.40

TABLE No. 45.

Summary of rainfall for growing season, May 1 to October 31, for twenty places in Connecticut for past 19 years.

YEAR	Highest	Place of Occurrence	Lowest	Place of Occurrence	Average of Twenty Localities
1889	37.38	New Haven......	28.64	N. Woodstock...	32.41
1890	31.87	Canton..........	24.89	New London.....	29.07
1891	23.11	Franklin	14.91	Waterbury	19.59
1892	29.06	Falls Village....	14.12	N. Franklin.....	19.67
1893	28.70	Oxford..........	18.31	New London.....	24.32
1894	24.35	New Hartford ...	15.69	Lake Konomoc ..	19.79
1895	25.66	Voluntown......	17.01	Newington	21.63
1896	26.19	Falls Village ...	16.99	New London.....	22.30
1897	39.78	Southington.....	23.46	New London.....	30.84
1898	34.88	Voluntown......	23.87	Winchester......	29.54
1899	25.69	Canton..........	15.04	New Haven......	19.34
1900	31.08	Falls Village....	12.40	New Haven......	19.65
1901	33.11	Waterbury	16.20	New London.....	27.80
1902	35.40	Cream Hill......	17.23	New London.....	27.21
1903	34.45	Hawleyville.....	16.13	New London.....	25.78
1904	28.47	Cream Hill......	17.04	New London.....	22.93
1905	31.55	Bridgeport	17.75	So. Manchester..	21.89
1906	30.34	New London	19.43	Danielson	24.93
1907	34.77	Cream Hill......	19.95	Colchester	25.46
Ave.	30.83		18.37		24.43

TABLE No. 46.
Chart of Rainfall and Temperatures.

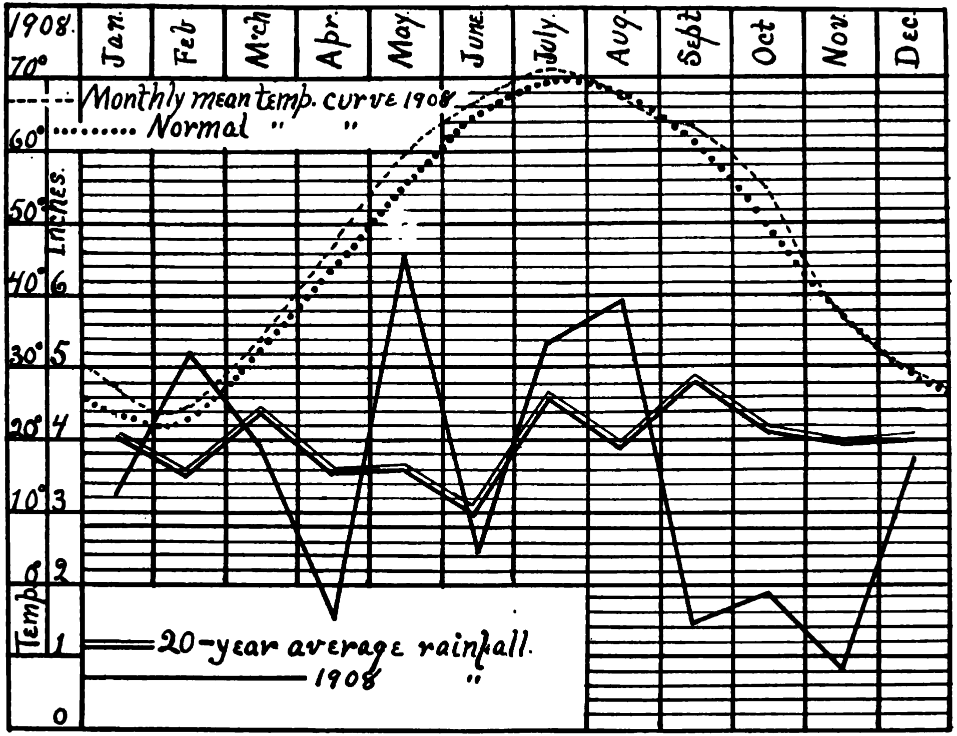

TABLE No. 47.

Lowest temperatures for each day in May for the past 20 years.

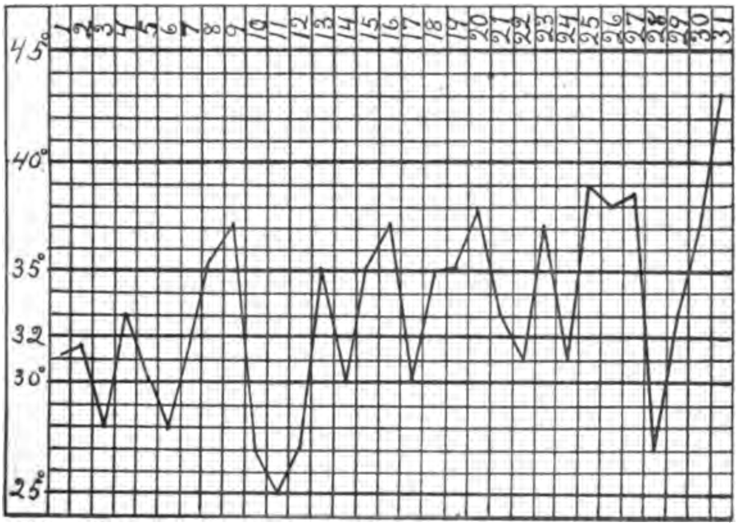

TABLE No. 48.

Lowest temperatures for each day in September for the past 20 years.

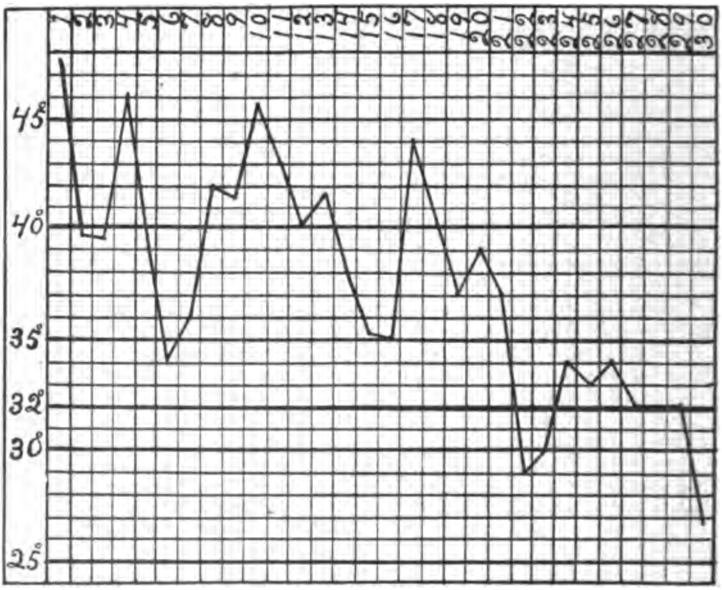

TABLE No. 49.

Grand summary for 20 years at Storrs.

Temperature.	Amount.	Date	
Mean	46.4°		
Highest	96°	July 5	1898
Lowest	—13.3°	February 17	1896
Highest annual mean	48.2°		1900
Lowest annual mean	14.8°		1904
Greatest range	109°		
Greatest daily range	46°	December 23	1902
Range of annual mean	3°		
RAINFALL			
Mean	46.00 in.		
Greatest annual	66.51 "		1901
Least annual	33.33 "		1894
Greatest monthly	12.24 "	July	1897
Least monthly	.37 "	February	1907
Greatest daily	4.26 "	June 21	1903
GROWING SEASON			
Longest duration of	173 days	Apr. 23 to Oct. 13	1908
Shortest duration of	114 "	May 16 to Sept. 7	1888
Average date of last killing frost in spring		May 7	
Average date of first killing frost in autumn		October 2	
Prevailing wind	Jan., Feb., March, Apr., Aug., Oct., Nov. and Dec.,		N. W.
	May, June, July and Sept.,		S. W.
For the year and most constantly	in February and November,		N. W.

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STORRS
Agricultural Experiment Station

STORRS, CONN.

BULLETIN No. 58, JUNE, 1909.

CAMEMBERT CHEESE PROBLEMS IN THE UNITED STATES.

BY CHARLES THOM.

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No. 14. The Elm Leaf Beetle.
No. 25. The Covered Pail a Factor in Sanitary Milk Production.
No. 28. Dairy Observations.
No. 29. Records of a Dairy Herd for Five Years.
No. 30. Spraying Notes for 1903.
No. 31. Food Value of a Pound of Milk Solids.
No. 32. Protecting Cows From Flies.
No. 34. Discussion of the Amount of Protein Required in the Ration for Dairy Cows.
No. 35. The Camembert Type of Soft Cheese in the United States.
No. 37. The So-Called "Germicidal Property" of Milk.
No. 38. The Marketing of Poultry Products.
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No. 56. Control of Insects and of Plant Diseases.
No. 57. A Study of Some Connecticut Dairy Herds.
No. 58. Camembert Cheese Problems in United States.

REPORTS.

The Reports of the Storrs Agricultural Experiment Station for 1890, '94 (Part III.), '95 (Part III.), '96 (Part II.), '98, '99, 1900, 1901, 1905, 1906 and 1907 are available for free distribution.

Address all requests to the Director of Storrs Agricultural Experiment Station, Storrs, Conn.

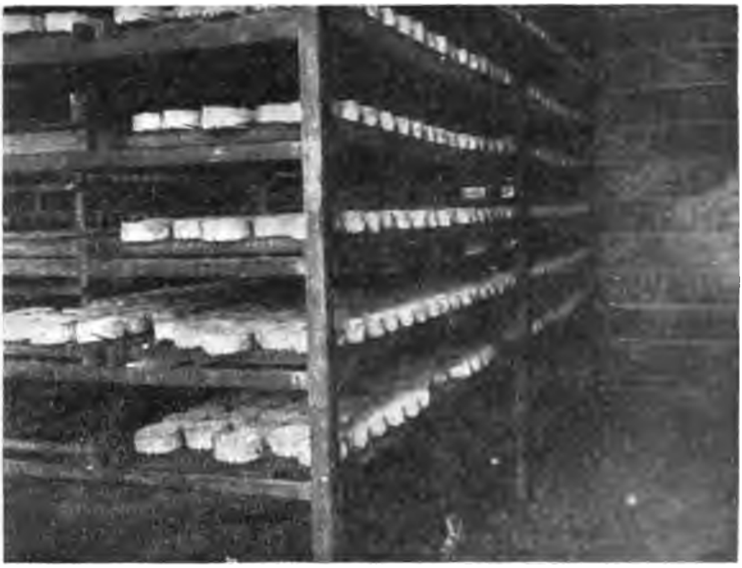

Fig. 79. Halloir of Camembert factory, by permission of International Milk Products Co.

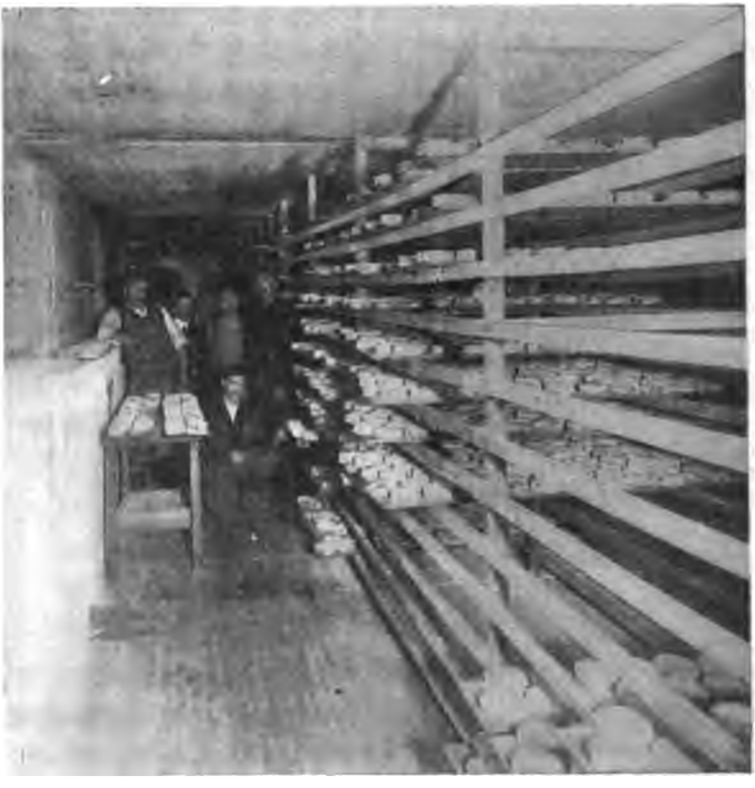

Fig. 80. "Sechoir" of factory at Sidney, N. Y., showing the ripening of cheeses upon smooth boards, and the arrangement of supports, by permission of the Phenix Cheese Co.

INTRODUCTION.

For the past five years co-operative experiment work has been conducted by the Storrs Agricultural Experiment Station and the Dairy Division of the Bureau of Animal Industry, U. S. Department of Agriculture. This bulletin records in part the results of this work. It is believed that this discussion will give certain information with reference to the manufacture of soft cheese in the United States that will be of practical value to any one wishing to manufacture this type of cheese.

L. A. Clinton,
Director.

Storrs, Conn., May 14, 1909.

L. A. Clinton, Director,
Storrs, Conn.

Dear Sir:—I hand you herewith a manuscript entitled "Camembert Cheese Problems." This paper is a report of progress and combines compilation observation in factories, conferences with practical cheese men, and the results of experimental work at Storrs. While I stand personally responsible for the manuscript which means the form in which this material is presented, every part of it has been discussed in detail with and agreed upon by the other members of the staff. I think therefore it should properly bear acknowledgment of joint authorship including Mr. A. W. Dox, Mr. F. R. Thomson, Mr. C. J. Grant and myself. Acknowledgment should also be made of conferences with and suggestions from Mr. A. W. Ferguson and Mr. G. H. Garstin, and analyses by Mr. H. D. Edmond. Many courtesies have also been extended by manufacturers and dealers of cheese. In presenting this paper, we cannot claim to have settled all points but we have gathered much information which has been carefully sifted so that what we present we believe to be sound as far as it goes. In the past year I have been called upon in answer to letters from correspondents to discuss nearly every topic covered in this manuscript at least three times. I think therefore its publication will be of interest and value to such people. I believe that the discussion of some of the other topics included and especially some of our experimental work described will be interesting to many who are not directly engaged in cheese work.

Respectfully submitted.

CHARLES THOM,
Asst.-Dairyman, in charge of soft cheese investigations.

SUMMARY.

The descriptions of equipment and conditions desired in making Camembert cheese, are based upon the practice of the factories in France and the United States. Pages 322-327.

MAKING PROCESS.

Making-room temperature—60°-75°F. about 68° preferred; kept uniform as possible. Page 326.

Air of room—moist to wet.

Milk—whole or very slightly skimmed (½%), not over 18 hours old. Page 329.

Starter—any standard form—0.5-1.0%, 12-18 hours ripening (over night) below 57°F. Pages 330-335.

Acidity at renneting—0.20-0.23% (phenolphthalein). Page 330-1.

Temperature of renneting—86°, limits 84°-90°F.

Rennet—3-5 oz. per 1000 lbs. (10-15 cc. per 100 lbs.). Page 335-6.

Curdling time, 1¼-1½ hours or longer. Page 337.

Cutting curd—not advised.

Dipping—uniform distribution of curd into hoops. Page 337.

Draining—until next morning without turning.

Inoculation with molds—not necessary except when establishing factories. Page 339, 340.

Turning—early second morning.

Salting—when firm enough to handle, usually 18-24 hours after dipping, several forms of manipulation used. Page 340.

Draining after salting—in making-room, 24-48 hours. Page 341.

Cheese ready for ripening—contains 57-60% water; when fully ripe 47-50% water; cheese outside such limits call for extra care in handling. Page 345-346.

RIPENING PROCESS.

Conditions in ripening rooms. 1. Temperature—52°-58°F. recommended. Lower temperature lengthens the process; higher temperature hastens it and hastens decay. Page 350. 2. Relative humidity—limits about 83% to 90% or 92%. Optimum depends upon temperature selected and water content of cheeses. For cheeses evenly drained and fairly firm at the beginning of ripening (perhaps 57%-59% water), probably the optimum would be 86%-88% relative humidity at 52°-54° F. Pages 350-352.

First two weeks. Cheeses are kept upon coarse matting (clayons). Conditions should be controlled to produce a moderately thin rind showing well distributed but not heavy areas of mold interspered with patches beginning to show reddish slime. Relative humidity must be held high enough to permit the slime to begin to show with the mold but not so high as to prevent the appearance of the mold. Cheeses will lose probably about 3-6% of water in this time according to the handling. Traces of softening under the rind show at the end of two weeks. Cheeses must be removed to smooth boards, or wrapped and boxed. Pages 363-4.

Third week. Slime areas increase without other changes in appearance; softening progresses rapidly. The rate of change depends on the temperature and the percentage of water still present. Enough evaporation must be allowed to bring the softened protein to the consistency desired (commonly 50-51% of water at the end of the time). The progress of this change can be constantly determined by feeling the cheese. Ripening of the proper texture and flavor must be well begun and the water content lowered to a safe percentage before cheeses can leave the factory with assurance of success in their further handling. Pages 364-5.

Further handling. According to the market demand, cheeses may be boxed and their further ripening be completed in the cellars or in storage in the dealer's hands. The ripening should not be complete before the end of the fourth week and may often desirably be lengthened considerably beyond the fourth week. The progress sought can be controlled to a large degree by controlling the temperature of the storage room, or ripening cellar if one is used. If cheeses have the proper consistency at the end of the third week, proper care alone should assure good results in the further ripening. This responsibility falls upon the dealer or consumer. Pages 365-7.

Analyses of imported and domestic Camembert have been tabulated and discussed to determine as closely as possible a satisfactory standard for this variety of cheese. Marked variations have been found in various brands. The analyses of cheeses selected as representing choice conditions of texture and flavor place the average of the best cheeses within approximate limits as follows: 47-50% water, 25-28% fat, 18-21% protein. Variations outside these limits are common but seem to involve more risk of defects than those within these limits. Pages 327-9.

The making process of Camembert subjects it to greater risks from the development of gassy curd than most other cheeses. During three successive years this trouble has been much greater during December, January, February and March than the rest of the season. A seasonal prevalence of the gas producing acid-group, "coli-aerogenes" is indicated for these months or parts of them. The introduction of ½% or slightly more pure starter with ripening over night at 50-57°F. has produced sufficient ripening to reduce gas formation to a minimum, without raising the acidity test (phenolphthalein) above 0.22-0.23%. Pages 331-5.

The changes of composition during the ripening period are the neutralization or destruction of acidity, the softening of the cheese due to proteolysis of the casein, and the lowering of the water content about 10%. The fat is little affected. The activity of the ripening agents and consequently the rate of ripening is found to be closely dependent upon the amount of excess of water in the fresh cheese above the water content of the ripe cheese, and to the rate and conditions under which that water is evaporated. Pages 346-8.

The temperature and relative humidity of the air in the ripening rooms determine the rate of loss of water in the ripening of the cheese. The temperature limits recommended are 52-58°F. The relative humidity indicated varied from 84 to 90% or even higher. Tabulation and comparison of mean temperatures and mean relative humidities for cities in Northern France and certain American cities in dairy regions, show that in America mean temperatures are either too high or too low for Camembert cheese ripening, except in parts of September, October and November. In the same cities the mean relative humidity remains too low in nearly every month of the year for ripening this kind of cheese. San Francisco alone of the American cities studied, shows conditions closely similar to those in northern France. Pages 356-60.

Ripening rooms built for climatic conditions found in France have failed to give success in America. Either domestic manufacture of Camembert must be abandoned in most sections, or, the construction of the rooms for cheese-ripening must be so modified as to obtain conditions desired. Page 360.

Factories to succeed in the eastern states must provide control of temperature and relative humidity within closer limits than those obtainable with the French plans hitherto used. This may be obtained by better insulation of the rooms already built, or by the construction of new rooms which may be partly or entirely below the surface of the ground. In either case, the building must provide means for thorough but controlled ventilation sufficient to carry off moisture as fast as required. Pages 361-2.

Those contemplating the establishment of Camembert cheese factories should study the climatic conditions of their locality thoroughly. The Weather Bureau of the United States Department of Agriculture can furnish data as to means and extremes of temperature and relative humidity in any section of the United States. The conditions found would control the type of factory required in each locality.

Camembert cheese-making for the general market is a factory proposition in which production upon the large scale conduces to economy of labor and uniformity of results. Page 368.

A good grade of Camembert can be made and ripened upon the farm with comparatively simple and inexpensive equipment. The difficulty of making uniform cheeses is greater when working upon the small scale. Such cheese-making cannot at present be advised except for home use or for sale to a special market served directly by the producer. Pages 369-371.

CAMEMBERT CHEESE PROBLEMS.

Numerous practical and scientific problems have been found in attempting to establish the manufacture of Camembert cheese in America. Part of these, together with the practices followed in the first two years of the investigation, have been discussed in previous papers. Before and during this investigation several factories undertook to produce this cheese in America. Most of these companies established plants reproducing as nearly as possible the buildings and equipment successful in France and employed experienced cheese makers from France to carry on the work. At one time the product of these factories made up fully one-fourth of the total amount of Camembert consumed in America. Production and sale of this cheese was, however, attended by uncertainties as to market and by numerous losses in the factory. Some of these difficulties were readily recognized but in many cases even the experienced maker failed without being able to find the reasons for his losses. So much difficulty and discouragement have attended these enterprises that some of them have been entirely abandoned and the product from all has been greatly reduced.

In continuing the investigation, experimental work at Storrs has been supplemented by study of the problems of the market, (Cir. 145 B. A. I.) and by visits to all the factories carrying on this work.

The following discussion is a report of progress upon the studies of the problems which have come up in this work together with modifications of handling which will bring the processes recommended into substantial harmony with factory practice.

In spite of the failures which have occurred in the past, there is good reason to believe that a readjustment of methods to conditions will eventually bring permanent success. Without such readjustment, the transplantation of the Camembert industry to our eastern states has so far disappointed the investors. It can not be claimed that all the difficulties have been overcome in the practices discussed in this paper, but much progress has been made toward practical working success and toward correct interpretation of the causes for past failures and losses.

FACTORY EQUIPMENT.

The equipment of a Camembert cheese factory comprises most of the apparatus and utensils common to all creamery work. A room for receiving and weighing the milk, apparatus for testing the amount of fat in milk, steam for heating and sterilizing purposes, etc., such as are found in any up-to-date dairy, are essential. In other words, all the usual contrivances that facilitate the rapid and sanitary handling of milk in large quantities must be provided.

All of the rooms in the factory should be constructed with a view to the maintenance of strict cleanliness. In the room in which the milk is delivered and also in the cheese-making room, the floors must be flushed daily with water to remove any milk or curd that otherwise would form a breeding place for germs or insects. To this end the floors should be of cement and should slope toward one or more drain pipes. The walls also should be of some material that can be kept clean, and should be painted or white-washed from time to time. The cheese-making room, as well as all the other rooms where the cheese is handled, must be protected from flies, and other insects. Unless great precautions are taken, swarms of flies will invade the room and deposit their eggs on the cheese, and a few days later in the ripening room these eggs will hatch out into maggots. All the windows must therefore be screened with wire netting of fine mesh, and every effort made to prevent the entrance of flies when the doors are opened.

RECEIVING ROOM.

The room for receiving the milk requires the same equipment as in ordinary dairy work. A vat is usually provided with capacity sufficient for the mixing, heating, and ripening of all the milk used each day. This may be either a single vat or several, but the use of the larger vat insures the thorough mixing of the whole milk supply and hence a more uniform composition of the whole lot from day to day than would be obtained from the use of several vats. Aside from the desirability of mixing the milk for uniformity a small receiving vat from which the milk runs directly through a milk heater to the curdling cans is equally efficient.

THE CHEESE-MAKING ROOM.

The floor of a cheese-making room is usually cement, either upon or slightly below the surface of the ground. The room should be well lighted. Double sash are used to protect the room from abrupt changes of temperature. Usually two or more of these windows are well screened and arranged to open conveniently for ventilation when desired. To avoid the accumulation of dirt the inside sash should be hinged and close up flush with the wall surface, leaving no ledges to gather filth.

EQUIPMENT OF MAKING-ROOM.

Aside from the general equipment of all creamery work, such as steam, water, and hose, the special equipment and apparatus for Camembert cheese-making will be briefly described.

Tables. Table surface enough is demanded to accommodate the cheeses to be made in two days. These tables (tables à mouler) are variously 36 to 42 inches wide fastened in pairs to the opposite sides of two vertical pillars about 32 inches above the floor. They are constructed of wood with smooth surface, sometimes of wood covered with galvanized iron. It is best not to have the wood protected with metal or any heat-conducting material. The temperature of the curd being several degrees above that of the room, the curd cools down more or less rapidly while draining, and the rate of loss of heat is increased when the curd is in contact with a cold sheet of metal. This retards draining and produces an uneven texture on account of the different rate of cooling of the top and bottom of the cheese. A raised edge on each side prevents whey from running from the table to the floor. The tables slope toward the pillars to which they are fastened and toward one end, so that a single gutter connecting their ends carries off the whey from all the tables. In most factories, directly above the draining tables and fastened to the pillars in the same way, three feet above the tables, are two shelves of about the width of the draining table. They are used for draining the cheese during the second and third days, when space is needed. These shelves are not used except when space is urgently needed and often not at all. Fig. 76, p. 342.

Aisles. The aisles between these tables should be wide enough for the maker to work comfortably. Sometimes only 26 inches are allowed but 32-36 would be more comfortable working room.

Draining mats. The form of draining mats is imported from France. They are made in strips, like cloth, of different widths and are bought by the roll. The matting purchased should be exactly as wide as the draining tables. It is composed of delicate wood strips held together by thread. The matting is cut into lengths convenient for handling and washing. These may be the full length of the tables unless the tables are very long.

Hoops or forms. The number of hoops provided should be twice the number of cheeses to be made per day. The hoops used vary slightly (perhaps ¼-inch) in diameter in different factories. They are preferably made of heavy tin with edges turned and soldered. The hoops used in factories visited have been 5 inches high and 4⅝ inches in diameter. Each hoop is perforated with three rows of holes 1-12-inch in diameter and about two inches apart in the row. Although hoops 5 inches high are regularly used, it is often necessary to fill them up after the curd has been dipped some time. When this is found to be the case, it might be desirable to make the hoops ½-inch higher. Some have used also a low hoop for draining the second day. Its use is not general and not recommended.

Disks. In some factories heavy tin disks are provided. These exactly fit the hoops and are used as weights to produce a smooth upper surface upon the cheeses. These have not been used much in America and did not give satisfaction when tried in our work. In the same factories a handle carrying a rubber sucking-disk is provided to remove these disks.

Dippers. The curd is transferred from curdling cans to hoops by means of long-handled dippers which are small enough for the bowl of the dipper to be lowered into the hoops.

Curdling cans. (Fig.76). Curdling cans are made to hold about 200 pounds of milk each. These cans are made of heavy metal and taper from about 12 inches in diameter at the bottom to 20-24 inches at the top. Handles at the top make these cans more convenient to move.

Trucks. (Fig 76). For each one or two makers dipping cheese, a truck must be provided. This essentially consists of a round base with a rim perhaps ½-inch high into which the curdling cans fit readily. Under this base rollers provide easy motion in any desired direction. The height of the truck plus the height of the curdling can should bring the edge of the can very nearly to the top of the hoops when arranged upon the draining table. This will minimize the labor of dipping as described later.

Curdling shelf. A shelf conveniently placed should raise the curdling cans from the floor just high enough to allow them to be slid readily upon the trucks. The tables are usually placed with one end toward the windows, the aisles between and across the inner end, with curdling cans arranged on their shelf along the inner wall of the room. Arrangement is, however, a matter of convenience. Instead of a wooden shelf, sections of the concrete floor along the wall are often simply raised above the main level of the floor high enough to move the cans easily to the trucks.

Salting boards. Boards or trays are provided for handling freshly salted cheeses while they remain in the making room. These are from ¾-inch smooth matched lumber held together by cleats to make the boards or trays about 24x30 inches—large enough to carry 30 cheeses.

Other apparatus has sometimes been used or recommended for the cheese-making room. Vats for example can be used instead of curdling cans, but entail a large initial cost to which must be added the constant extra labor of lifting curd by dipperfuls from the vat across the aisle to the hoops. This extra labor is in itself prohibitive of the use of vats. The use of corrugated draining boards upon the tables is added labor and expense, and also without compensating advantage. The apparatus described here has shown its economy by its general acceptance in cheese factories.

CONDITIONS DEMANDED IN MAKING-ROOM.

Temperature—Limits 60-75 degrees Fahr., preferred 68° Fahr. The limits given here are recommended by students of French practice. Experimental work has shown the same results. If the temperature is allowed to go below 60° F. the drainage of cheeses is delayed or even entirely interrupted. If the room is too warm, the danger of developing gassy cheeses is much greater. Bacteriological studies by Conn, Esten, Stocking, and others have fixed 70° F. as a condition under which the typical lactic bacteria work more rapidly than gas-producing types; whereas from 70 to 98 degrees—as the temperature approaches blood heat, the gas-producing species gradually increase in activity until they reach dominance. At higher temperatures the rate of separation of whey increases also. It has been found desirable to hold the making-room slightly under rather than over 70 degrees Fahr., if there is a preference within the limits given.

Humidity. The room should be kept moist—not fully saturated, but so moist that surface evaporation is slow. Rapid evaporation causes the curd to adhere to the hoops and makes badly shaped cheeses. Cheeses tend to dry out and shrink quickly in dry air. The upper face of a cheese will shrink in diameter often a half-inch while draining in a dry room. Rapid evaporation produces a thin hard rind over wet curd instead of a gradual and uniform reduction of water content throughout the whole cheese. To obtain the proper water content a cheese must drain out—not dry out.

Ventilation. The actual rate of ventilation in this room appears to matter very little so long as the air is kept pure. In our climate the changes of temperature are more rapid and the air averages much dryer than in Normandy. Ventilation must therefore, be much more closely restricted to avoid dryness than in French factories. The cheese-making area in the United States is also much higher above sea-level with prevailing winds blowing over large land areas. All these things contribute to the need of greater restriction of ventilation of the making-room than appears in French factories.

Milk. Good clean milk, not over 18-20 hours old forms the best basis for work. Milk older than this, if well cooled and cared for, may be used, but the danger of gassy fermentations increases so greatly that our experience amply justifies the French practice of using the fresh milk of the morning mixed with the well cooled milk of the night before.

STANDARDS OF COMPOSITION.

The practice of removing a small part of the fat from the milk used in Camembert cheese is admitted to be very common in France. The amount of such skimming varies with the maker, the richness of the milk, and the season. The several brands appearing in the American market have been purchased and analyzed from time to time during the past five years to establish if possible, a standard for comparison. Table 28 presents fairly representative analysis for cheese appearing upon the market in fall and winter.

TABLE 28

Analyses of market cheeses. Camembert.

Analyst	Water %	Fat %	Protein %	Fat:protein
1. Dox	47.50	26.30	21.8	1.0:0.82
2. Dox	45.59	27.71	21.40	1.0:0.77
3. Dox	46.36	27.78	21.21	1.0:0.76
‡4. Edmond	48.41	27.01	19.36	1.0:0.71
5. Edmond	48.79	26.72	18.75	1.0:0.71
6. Edmond	43.08	32.13	21.27	1.0:0.66
7. Edmond	44.25	31 09	19.69	1.0:0.60
8. Edmond	50.59	26.30	18.83	1.0:0.71
9. Dox	47.03	26.67	20.32	1.0:0.73
10. Edmond	54.41	23.04	16.83	1.0:0.73
11. Edmond	51.23	25.68	17.61	1.0:0.68
12. Edmond	47.69	27.32	19.05	1.0:0.69
Average 12 analyses	47.91	27.33	19.66	1.0:0.71
Dropping fractions	48.%	27.%	19.%	

No. 4 reached the analyst in almost perfect condition both as to texture and flavor. It may be regarded as nearly a typical analysis, therefore, for the best Camembert. Numbers 8 and 9 were made in America. All of the others were imported.

Taking the relation of fat and casein given by Van Slyke,* numbers 6 and 7 represent approximately milk testing 4% fat. This allows a casein loss of 0.1 and fat loss of 0.2-.25%. Inspection of the ratio of fat to protein in every other case shows evidence of the removal of a small part of the fat in all cases. Some of these cheeses were manifestly low in water content from exposure in the market and consequent evaporation. The same is very evidently true of certain of the analyses given by Von Klenze and by Doane and Lawson.†

The percentage of water as shown in this table was from 43.+ to 50.+% but in those cheeses analysed in the best condition the percentage has been found to vary from 46 to 50% or slightly more, probably 48% plus or minus 2% would include most of the better cheeses as they reach the American market. It must be admitted, however, that very many good cheese found in the open market show signs of shrinkage which indicates that they had contained 52-55% of water or even more at the time of shipment. 50% may therefore, be considered a fair average for partially ripe cheeses, when they go to market. The further ripening commonly reduces this 2% and often 3 to 4% without serious loss of quality.

In fat content aside from numbers 6, 7 and 10, in the table, all these cheeses varied little more than 2%, i. e. from 26 to 28%. Numbers 6 and 7 were especially high in fat, correspondingly low in water and appeared to represent the output of a single factory. The column marked *Protein* shows almost as narrow a variation in the average cheese, running from 19 to 21%. Analysis of the richer grades of American milk indicates that at least ½% of fat may be removed from milk testing 4.25%

*Van Slyke & Publow, Science and Practice of Cheesemaking, page 233, table. † U. S. Dept. Agr. Bur. Anim. Indus. Bul., 105. Varieties of cheese.

or over and leave the ratio of fat to protein as high as found in good imported cheeses. In very rich milk, the fat figure would yet be relatively too high in many cases.

STANDARD MILK FOR CAMEMBERT.

The analysis given supplemented by series of cheese made from milk standardized at from 3 to 6% fat content, show that Camembert cheese requires good milk but not milk excessively rich in fat. A close correspondence with the composition of the best imported cheeses was obtained with Jersey milk standardized to 3.8% fat—a per cent rather above that of average factory milk. The ratio of fat to protein in the average anaylsis, 1:0.72, indicates the removal of some fat as the usual condition. Although certain factories manifestly use whole milk, in most factories a moderate skimming is always practiced. There appears to be good reason to believe, as claimed by Roger that the ratio of fat to protein shown by the average analysis of Camembert produces a cheese of better texture and more satisfactory flavor than when the fat is greatly increased as is the case with unmixed Jersey milk, for example.

Since, however, there is no profit in skimming, it should be practiced as little as possible. For profitable results cheeses should be made to carry all the fat they will without excessive percentage of fat causing injury to texture and flavor. If we calculate Camembert at approximately 50% water, every pound of milk solids (fat and casein) carries with it an equal amount of water in making up the yield of cheese. Milk fat therefore, sells in the same markets more profitably as Camembert cheese than as butter. The removal of more than 0.5% of fat is probably not warranted with ordinary factory milk. In some cases a less amount would be better; but some fat should ordinarily be removed from all milk, to obtain the proper proportions of fat and casein in this cheese.

RELATION OF FAT AND WATER TO TEXTURE.

In studies of cheeses made from the same milk standardized to high and low fat content, it is uniformly found that under conditions otherwise the same, the milk low in fat produces cheeses higher in water content. In Camembert therefore, as in the hard cheeses, to obtain the same texture from milk partly skimmed as from rich whole milk the loss of fat must be partly, at least, compensated by leaving a higher percentage of water.

"STARTERS."

Some makers claim not to use starters. Our experience has always justified the use of starters, in the reduction of losses from gas, and by the production of better draining cheese.

KINDS.

The so-called "Natural" starters when entirely free from gas or taint are always good. Many factories use no other kind.

Buttermilk when in *good* condition produces acidity rapidly, and gives a product uniform in flavor and texture. It is subject to rapid deterioration, however, and if used must be watched carefully for gassy fermentation.

Commercial starters. The commercial starters produce, as a rule, excellent final acidity and seem to result in cheeses of stronger flavor. It has been generally more difficult however, to obtain uniform results with them. Apparently starters made from these cultures have varied considerably in the rate and intensity of their activity, hence cheeses made from day to day differed more than those made with a "natural" starter. With proper care, commercial starters probably give the best results on an average.

Acidity at renneting time.* From 0.20-.25% has given our best results. If the acidity is higher the curd is not so smooth, i. e., when broken between the fingers, it feels grainy or mealy, "rough." If acid is too low—0.16-.18%—it requires more rennet, longer curdling time and longer draining time, but produces a good curd in our experiments. Since, however, milk usually enters the factory with some acidity it is hardly practical to plan to work at an acidity lower than 0.20%. The practice has therefore been adjusted to such milk as is usually obtainable. On the same grounds, with equal reason, milk with higher acidity than 0.20% when received is not desirable and should be prevented by insisting upon cleaner and fresher milk. Milk with acidity when received quite often develops gas or other fermentation, (yeast, bad odors, etc.). In other words, such acidity when received suggests milk which is already old, or dirty or both. Milk known to be gassy or in which conditions point to gas-formation should be rejected.

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*The percentages of acidity given in this paper are obtained by titration to phenolphthalein of 17.6cc. of milk with $\frac{n}{10}$ sodium hydroxide. The number of cubic centimeters of alkali required divided by 20 gives the percentage of acidity calculated as lactic acid.

The addition of acid or strong starters in quantity sufficient to bring clean fresh milk to the acidity desired, at once, has been tried but without satisfactory results. Success in making this cheese calls for the development of acidity by the development of the typical lactic organisms rapidly enough to prevent unfavorable fermentation. The bacteria added in very sour starters seem to require some time to adjust themselves to growth in fresh milk. If, in this same time, the milk is curdled and partially drained of whey, which carries out with it a large part of the milk sugar, the souring process does not seem to go on normally. We seek by the addition of starter to give the organisms desired, a thorough distribution through the milk and very quickly, at least, a preponderance of numbers over the undesirable species. In these experiments the advantage seemed to have been thrown away when rennet has been added without interposing a short ripening period. Whether the failure, in such a case, is due to incomplete distribution of the organisms or to the changed composition of the milk due to curdling and draining, is not determined.

The presence of the organisms producing gassy curd is very common in Camembert cheese. Many of the market cheeses both domestic and imported show more or less gas when cut. Although good cheeses often show traces of gas, the presence of many gas-holes in Camembert lowers its quality. A careful study of the prevalence of gas formation and its control seems very necessary to success.

SEASONAL VARIATION IN THE PREVALENCE OF GASSY CURD.

For three successive winters, 1907-1908-1909, gassy fermentations during January, February, and March, have been found and shown to be due to the prevalence of the coli-aerogenes group (identified by Prof. W. M. Esten) in the milk during these months. Incubation experiments with samples of milk during portions of the winter of 1909, failed to develop normal smooth curd in any large percentage of samples studied. Experimental manufacture of Camembert cheese during the same months for the three years was seriously interfered with by the constant appearance of these organisms. The coli-aerogenes forms produce gas holes of varying size in Camembert curd and give to the newly made cheese an offensive odor. In these same months of each year the normal activity of the typical lactic species (B. lactis acidi) which usually reduces or entirely eliminates the gassy fermentation failed to develop in untreated milk. Examination of the product of certain factories in New York state showed the same conditions to be prevalent there during the same seasons. Imported cheeses purchased for examination commonly showed more or less of the same trouble. There seems therefore to have been a periodical and perhaps a seasonal failure in the activity of the normal souring organism, even when present.

In general, this has resulted in the dominance of the gas-producing type during the first 24 hours at least, i. e. during the draining period of this kind of cheese. This is long enough to injure the texture and odor of the newly made cheese. Such gassy cheeses often settle together in the succeeding days so that the gas-holes are closed and temporarily nearly obliterated. In such cases the typical lactic forms have probably become dominant as the acidity of the cheeses increased. After the milk-sugar is used up the activity of both forms ceases or nearly so. In the later stage of ripening, however, after the cheese has begun to soften, the gas organisms seem to resume activity and render the ripe cheese noticeably gassy and often seriously bad flavored.

During the gassy period, the methods which produce good drainage and smooth-textured cheese during the remainder of the year have failed to be effective either in our experimental work or in factory practice as judged by the cheeses in many cases. A series of experiments were made to devise means of eliminating or controlling the gassy conditions. Some of these are tabulated as follows:

TABLE 29

STARTER EXPERIMENTS BY C. J. GRANT.

Exp. No.	% Starter	% Acidity Milk and Starter	Hours Ripened	Final % Acidity	Temperature		Results
					At Beginning	At End	
1830	0.		0	.17			very gassy
1831	0	Stood in refrig	erator 48 hours	.18	below 60° F.		very gassy
1834	4	.225	$1\frac{5}{6}$	.255	86°		no gas
1835	10	.25	$1\frac{5}{6}$	.30	86°		no gas
1836	1.8	.19	24	.31	‡66°		no gas
1837	5.6	.225	24	.44	‡66°		no gas
1840	0.1	.18	24	.20	50°		very little gas
1841	0.3	.18	27.5	.215	50°		very little gas
1842	0.1		24	.25	60°	60°	slightly gassy
1843	0.3		24	.27	60°	60°	more than 1843
1867	2.		24	.225	52°		trace of gas
1870	1.	.18	24	.245	58°	58°	no gas
1872	1.	.185	24	.23	58°	58°	trace only of gas
1875	0.5		24	.275	60°	58°	trace only of gas
2356	1	.18	16	.18	44°	50°	no gas
2358	1.	.18	16	.21	51°	51°	no gas
2360	1	.18	16	.215	43°	54°	no gas
2362	1	.18	16	.20	42°	53°	no gas
2364	1	.18	16	.20	45°	54°	no gas

‡Acidity developed very rapidly in 5 hours. Put in refrigerator the remaining time.

The last five experiments were made to show the relation of temperature to the production of acidity. The gassy season was already past.

Our work indicates that much more care should be given to the production of a starter in these cold months. Repeated preparation of pasteurized milk by methods satisfactory at other seasons showed traces of gas after inoculation with cultures and incubation. When, however, the skim milk used was *boiled* no difficulty was found in obtaining normal souring. For use as shown in the table the starter was added in amounts varying from 0.5% to 10% and the milk was ripened for various periods after the addition of the starter.

In these experiments it was readily shown that the addition of 3% or more of strong, active starter would reduce the gas formation to a negligible amount, if a comparatively short ripening period were used. In many cases, however, the acid added in the starter together with that developed in ripening affected the texture of the cheese too greatly. Milk titrating from 0.24 to .25% acidity nearly always produces a rough or mealy curd. It is difficult to employ the larger percentages of starter because they tend to raise the acidity too greatly. Other experiments have shown that a smaller amount of starter, ½%, or something less, acting for a longer period will produce what may be called a protective ripening, that is, inhibit gas without too great rise in the titration figure. An experienced factory manager has said that he regards 0.20% acid by titration as a conservative limit to ripening. This figure is, in our experiments, too low to prevent gas-formation during the winter months. Examination of cheeses from the same manager's factory for successive seasons showed that his work suffered from gas also, during each winter.

As noted above, the same trouble has been seen in varying degrees in a large proportion of the domestic and much of the imported cheese during the winter months. When gassy troubles occur, there appears, therefore, good reason for recommending that the acidity at renneting time should be raised to about 0.23%. Long series of experiments indicate that milk can be handled at this acidity without injuring the texture of the resulting curd.

AMOUNT OF STARTER: RIPENING PERIOD.

The length of the ripening period desirable as well as the amount of starter must depend upon the conditions. The same result can be reached in different ways. If milk well cooled and free from taint is received during the day and kept over night, ripening may be controlled by a minimum amount of starter, 0.5% or even less perhaps, added at night to milk kept below 57° F. If the temperature goes higher, too high acidity may be anticipated. The same good result has been obtained by adding about 3% of good starter when the milk is heated for cheese making and letting it ripen at 85° F., until it has developed acidity to 0.22-.23%, but in this case it must be watched to avoid too high acidity. In using starters, it is quite generally agreed that a fresh starter, already quite sour to taste but not curdled is preferable to the same starter after curdling. The organisms in the sour but not curdled starter appear to adjust themselves more readily to the fresh milk and to produce acidity more quickly.

CHEESE-MAKING.

Temperature. The mixed milk is ordinarily heated to 85° or 86° F. The limits of satisfactory work are probably from 84° to 90° F. If color is to be added, it should be done before the milk leaves the mixing vat.

"Setting" and rennet. When heated, the milk is distributed into curdling cans. In factories, the milk is often led from the vats through tin or tin-lined pipes running above the row of cans, with a cock opposite each can. Special forms of apparatus are a convenience but not necessary.

The milk is now ready to "set." For this purpose any standard form of rennet may be used. For Camembert, rather more rennet is desirable than for American cheddar cheese. Calculated on a basis of 100 lbs. of milk from 10 to 15 cc. of commercial liquid rennet (3 to 5 oz. per 1000 lbs.) may be required to obtain the proper texture of curd, according to the conditions of work. This calculation assumes the use of good clean milk not over 18 hours old, or testing when received not more than from 0.16 to 0.18% acid.

Considerable disagreement is found among the recommendations as to the amount of rennet, the temperature to use, the acidity, and the length of curdling time desirable for Camembert. In experimental work, different practices have been made to yield cheeses so closely alike as to baffle the description of their differences. In general, comparatively large amounts of rennet have given firmer curds and produced better textured cheeses than the use of minimum amounts. Such cheeses drain more rapidly at first but retain more water when drainage finally ceases than those made with the smallest amount of rennet which will permit working. The smaller quantity of rennet produces soft curd which drains more slowly but ultimately drains lower than the other and makes hard dry cheeses. The strength of the rennet, the acidity and composition of the milk, and the local conditions are variable factors. The cheesemaker must have in mind the ideal condition of his curd and adjust his own practice to approximate that ideal.

The directions given here do not attempt to settle disputed questions about rennet and its effects. They do, however, represent accepted practices which have also given satisfactory results in experimental work.

Curdling time. Curd should be ready to "dip" in from 1¼ to 1½ hours; some prefer even a longer time. This will be indicated by the curd beginning to "sweat"—the appearance of drops of water (whey) scattered over the surface of the mass of curd. These drops soon form into a thin sheet of whey upon the surface. This whey if tested for acidity as it separates usually tests from .02 to .05% less than the milk at setting time. The curd is now ready to "dip." This curd should be smooth textured and quite firm. Cans of curd should not stand long after they are ready to dip. If curd stands a long time in the whey, it may become tough or sour, or may cool to a temperature which seriously delays draining, according to conditions. If large amounts of milk are to be handled cans should be rennetted or set in series so that they become ready to dip as needed.

Cutting.. Some makers cut the curd slightly. In cutting they use a curd-knife designed to make circular cuts in the mass. Although such curd drains more rapidly, very little advantage can be claimed for cutting curd at all if working conditions are what they should be*. In most experiments the advantages in texture, flavor, and handling have favored curd handled without cutting, and this is the practice most generally observed in the best factories.

Arrangement of the hoops. While the milk is curdling the matting is spread upon the draining table and the hoops are arranged upon the matting as closely as possible. The whole should then be thoroughly wet with warm water so that table and matting shall be wet when dipping begins. If the matting is not wet, curd sticks to it and causes trouble and loss from breaking cheese when they are turned the next day.

Dipping. When a can of curd is ready to dip, the truck is brought into position beside the shelf and the can of curd gently swung upon it. The truck is then pushed into the aisle between the tables, so that the edge of the can comes as closely as possible to the tops of the hoops upon the table.

In dipping, each dipperful of curd is lowered into the hoop and emptied with as little breaking as possible without loss of time. One dipperful each is put into a series of hoops and the process repeated until each hoop contains the required amount of curd. This allows time for partial drainage between dipperfuls.

To obtain cheese of the desired size with the regular size of hoop, it is often necessary to fill up the hoops again after the curd has drained an hour or two. Some experiments indicate

*Cutting curd to hasten drainage is a recourse which sometimes aids work with too cold rooms or rooms which become cold at night. In general in such cases, the condition should be corrected as soon as possible instead of changing the practice.

that the same result would be more economically reached by making the hoops about ½-inch higher. French factories report that two liters of milk are sufficient to make a cheese of the usual size. With common factory milk in America, five pounds have been reported as necessary to produce the same size of cheese. It is important that the cheeses be uniform, i. e. that the total amount of milk be evenly distributed into the proper number of hoops. The time required to do this will vary from day to day because of variations in the condition of the curd, but this should not be permitted to affect the size of the cheeses.

Two workmen to each can of curd will insure that the whole can will be emptied so quickly that breaking and draining in the can is reduced to a minimum. When a can is emptied more slowly some of the curd becomes broken and hardens rapidly with a tendency to the production of uneven texture in the cheeses. Quick and careful handling produces the best results.

Draining. In a room at approximately 68° F., proper draining of the cheese will require about 18 hours before the cheeses are solid enough to turn without breaking. In this time the cheese should have drained to less than two inches in thickness—perhaps 1½ inches. When ready to turn, the cheese should have a sort of elastic softness, tenacious enough to permit turning with the hand without the removal of the hoop. This turning is usually done the first thing in the morning of the day after the cheese is made. If the room is dry some cheese in draining will adhere to the hoops, causing a thick edge and a "dishing" of the center which sometimes is only half the thickness of the edge. While especially liable to occur in a dry room it may also happen if the hoops are rough or rusty inside, or the holes are too large. A smooth tinned surface with very small holes seems to reduce the trouble greatly, without the smallness of the holes checking the drainage.

Trimming. Rough edges may be trimmed with a knife or an instrument designed for the purpose consisting of a round disk with sharp edges attached at the center to the end of a round handle.

In some factories after dipping, disks of heavy tinned iron which fit the hoop closely are dropped upon all the freshly-dipped cheeses. These disks are claimed to prevent unevenness of surfaces. They exert a slight but cóntinuous pressure upon the curd. A sucking-disk of rubber on the end of a handle is used to remove these in the morning.

INOCULATION WITH CAMEMBERT MOLD.

If it is done at all—do it just before salting.

Inoculation with mold spores has not been practiced in Camembert cheese factories. Once in the factory, the mold has been left to propagate itself. Examination of cultures from most widely separate sources indicates, however, that this mold is not native in America although there is no difficulty in propagating it here. There seems to be excellent reason for introducing this mold by definite inoculation when new factories are established. Once introduced, so long as proper conditions are maintained, the mold propagates itself so well, as a rule, that inoculation of the fresh cheeses from day to day with pure cultures is probably unnecessary.

When pure cultures are found necessary it would be best to procure them from some reliable laboratory. They can, however, be prepared at home by any one slightly familiar with the methods of culture used in bacteriology and mycology. When procured they may be used as follows: "Take a small jar with a tin cover which has been punched full of small holes, (or an ordinary pepper box). Fill it half full of water, add a piece of moldy cracker or a piece of cheese with a good growth of the proper mold, and shake thoroughly. The contents of the jar are now sprinkled upon the surface of the cheeses, the cheeses are then turned and inoculated in the same manner on the other side."

Mold for inoculation. For those desiring to prepare inoculating material the following practice is recommended: Obtain the hard dry "water cracker" ("milk crackers" are not satisfactory). Fill quart fruit jars with these crackers, screw on the covers loosely without rubbers. Bake in an oven about two hours. (In a laboratory dry sterilize at 140° C. for one hour or more). Care should be used not to burn the crackers. The spores can be transferred directly with a sterilized needle, from a stock culture which should be procured from a reliable laboratory. Or they may be put first into sterile water. For each quart jar about three ounces (100 cc.) of water to which from 2 to 5% of lactic or tartaric acid has been added, should be sterilized, (or boiled thoroughly in a flask plugged with cotton). After cooling, this water may have the mold spores put into it and then be poured into the jar—(precautions being used to keep out contaminations), when *one side* only of the cover is raised sufficiently. Roll the jar in the hands to wet all the crackers. When the crackers are all wet pour off the excess water before they soften into a pasty mass. Set away at living room temperature (70° Fahr.). The crackers should be well covered with cottony white mold in 10 days. The gray-green color of ripe spores which follows in a few days indicates that the crackers are ready for use.

Salting. After turning, the cheeses drain for several hours upon the same mat in the place in which they were made.

When solid enough to stand handling, and as the workmen have time, the cheeses are salted. Various methods are in vogue. Some take one or two cheeses in the hands and roll them in salt, edges and both sides at the same salting. Others carefully dust the upper surface and the edges at one time, and salt the other surface at a second salting a half-day to a day later. Many makers object to handling or rubbing the surface of the cheese while salting. In this practice the cheese is touched as little as possible and only on the edges. Others pay no attention to the details of handling. We have found little advantage in any specific form of manipulation in salting.

The salt used is usually coarse grained, and thoroughly dry. When salt is applied to the surface of a cheese, water (whey) is extracted by the salt. A large part of the salt flows off in this whey and is lost. Some of it, however, diffuses into the cheese. The taste for salt in cheese differs greatly. Different makers of cheese respond to the demand by using different amounts.

The salting establishes a rind upon the fresh cheese. On this rind the molds and bacteria develop afterward. Many theories are heard as to the relationship of salting to draining and to the growth of the ripening organisms. Proofs of particular views are difficult to obtain because the conditions under which each maker has developed his own view have never been adequately defined. Experiments show the ripening of the cheese is closely dependent upon its water content and the ripening conditions. The balance between these conditions differs in different factories but may still be adjusted to obtain good final ripening. No one has been able, therefore, to test all these theories.

After salting, the cheeses are placed upon salting boards where they remain until they go to the curing room (halloir). The boards are first conveniently rested upon the draining table with edge next the aisle supported by the raised edge of the table, so that the workman can grasp the edges of the board.

If space is needed the salting boards are next raised to the shelf above the draining table where they remain for the final day of draining. In this way the draining table is cleared for cheese-making without removing the cheeses from the room. It is possible to use the same tables on successive days for making cheese by removing cheeses to the shelves above in the morning and hurrying the salting process, but larger table space permitting half the table surface to be used for making cheese each day, seems an economy of labor.

Draining after salting. If drainage goes on properly a cheese should be dry enough to salt by the time it has been dipped 18 hours (in the morning after making) or even in less time. A cheese that is *wet* after 18 hours (in the morning after making) will probably be ready to salt by the afternoon of that day. The drier cheese salted the second day should stand in the making-room until the third afternoon—that is, about 30 hours after salting. If, however, the cheese is wet at 18 hours old and salting is delayed to 24 hours old or longer, it should stand after salting at least 12 hours longer than the other—say 42 hours after salting. No absolute time can be stated, the figures given, however, may be regarded as intervals found in practice for draining under those conditions.

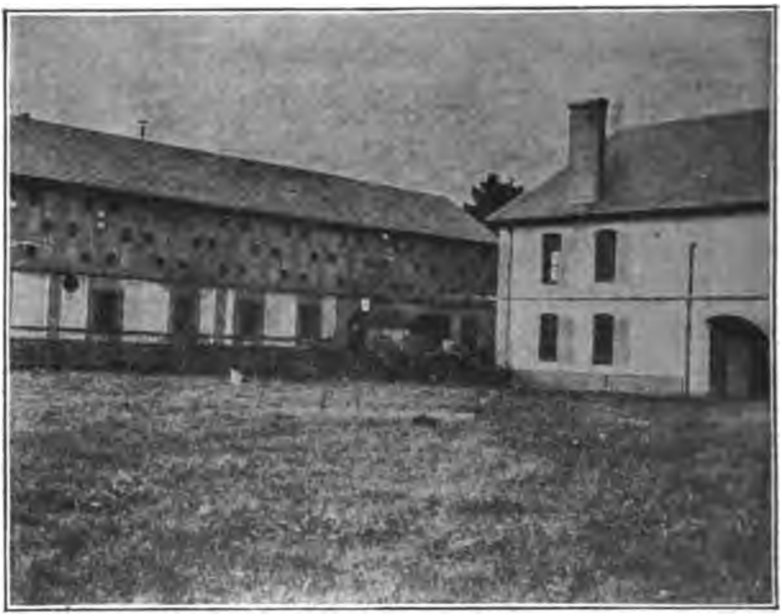

Fig. 75. Factory of M. Rendu, Lisieux, France, showing the making room, on the ground floor, where the wagon is discharging a load of milk, and the "halloir" above it, with the numerous little windows.

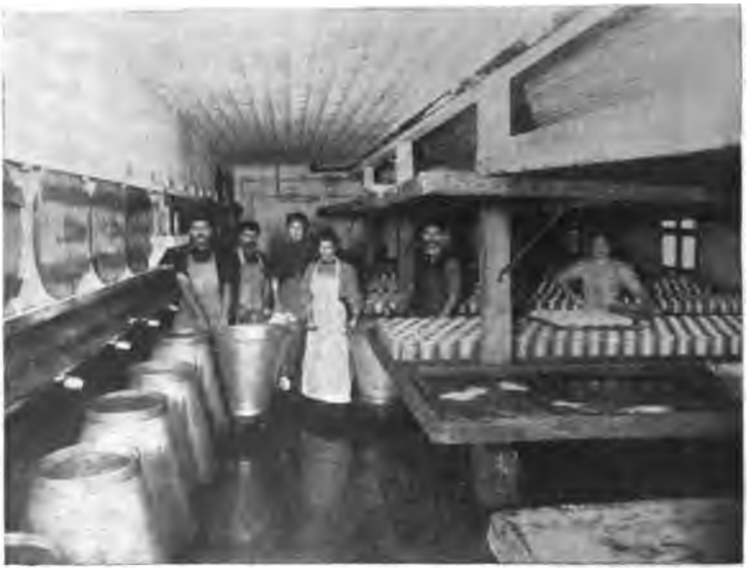

Fig. 76. Cheese-making room of Camembert factory at Sidney, N. Y., showing tables, curdling-cans, trucks and arrangements for work. Printed by permission of the Phenix Cheese Co.

Before leaving the making-room the cheese should be solid enough so that there is no tendency for the fingers to dent the edges of the cheese when picking it up.

CAMEMBERT CHEESE RIPENING.

Ripening rooms seen in use. In factories in France and in those established by French cheese-makers in this country (Figs. 75-77) the cheeses are made in a ground floor room as a rule then carried to a second floor room just above the making-room. This first ripening-room is furnished with windows upon two sides at least, to provide facilities for rapid ventilation. Various names are given to this room, one of the commonest of which is "halloir." It is characterized by the ample provision for ventilation in the rooms (Fig. 75, 77). In our climate with its extremes of heat and cold these windows have outer and inner sash, both hinged, making possible the free ventilation when wanted, or by tightly closing the sash the stoppage of ventilation and the prevention of rapid heating or cooling in response to changes in the weather. These windows may be large and run from floor to ceiling or be small rectangular openings scattered over the whole side of the room. In all cases such windows must be closely screened to exclude the small flies which are so serious a pest in cheese work.

The humidity in these rooms as observed has varied from complete saturation to a condition permitting rather rapid evaporation and shrinkage of the cheeses. The difficulty of preventing one or both extremes has been the usual trouble met.

A factory manager of experience puts the proper time in the halloir or first room at 10-13 days. In the further ripening several practices are found. The ideal French practice, according to the same manager, transfers the cheese from the halloir (first room) to the "sechoir" (2nd or drying room) as soon as the moldy rind with traces of bacterial slime is properly established. In this room the ventilating windows are opened and the evaporation of the extra moisture is accomplished. The cheeses are shrunk from 1 to 3 ounces in weight and reduced in size until they exactly fill the boxes. They are then packed and crated for further ripening. Ideally such cheeses go now to a ripening cellar to be finished for market. When they come from the "sechoir" softening should have just begun. In the ripening cellar, evaporation should be but slight and the further ripening should be carried as near completion as the market will permit before shipment.

In actual practice, however, makers both in America and in France have often used but one room, the so-called "halloir" in which atmospheric conditions have been kept sufficiently dry to bring the cheese to the desired size and appearance in about two weeks in warmer parts of the season. The cheeses are then boxed and crated for ripening or for market. The difficulty of obtaining the desired conditions in the two rooms has often lead to this substitution of one for two rooms, with very commonly a resultant loss of character to the cheese. Either the room is too dry, which produces cheese lacking in moldy covering, shrinking and becoming hard too rapidly, or it is kept too wet so that ripening develops very rapidly and the cheeses must be sold partly ripe or lost. Either extreme changes the character of the ripening. In both cases the tendency has been to box and pack the cheeses while still containing too much water which has led to unpleasant odors and unsatisfactory appearance in the ripened product. Since the market demand for cheeses fully ripe has more and more superseded the trade in half ripe cheese in America it has become increasingly difficult to run factories as at present arranged.

EQUIPMENT OF RIPENING ROOMS.

For ripening Camembert cheeses a particular form of shelves has been developed. The permanent part of these consists of posts from floor to ceiling of 2x2, or 2x4 lumber in sets of 4, 5, or 6 feet apart. In each group the end posts and the parallel posts of this series are connected in pairs by permanent crossbars of similar size about one foot apart, from floor to ceiling, nailed or bolted to the inside of the posts (Fig. 78-79). Frames of strong lumber are made to fit exactly between these uprights resting on the cross-bars. These frames are composed of strong side and end pieces, and lighter cross strips.

Each frame is covered by a piece of coarse matting ("clayons"). This consists of thin round strips of wood, held 1 to 1¼ inches apart by wire strands. The cheeses lie directly upon this matting. A cheese will rest upon three or four strips so that the surface is almost entirely exposed to the air. Such frames carry about 90 cheeses each. Two frames exactly fill the area between four posts so that all the cheese are within reach from the sides.

Windows well-screened should provide abundant light for working in these rooms. Artificial light (aside from electric) is undesirable because vitiating the air. There is no advantage in dark rooms because experiments with dark rooms indicate that the trouble from fly-maggots is greater under dark conditions than in fairly well-lighted rooms.

Ripening Boards. Smooth boards 8-9 inches wide and exactly long enough to rest upon the same supports are used to replace the frames and coarse or grating-like matting in the later stages. These boards are wide enough to carry two rows of cheese and smooth to avoid the tendency of cheese to stick to the wood. The cheeses should be removed to the boards before softening begins. If left upon the mats (clayons) the strips of wood begin to cut into the ripened cheese as soon as softening commences.

Before making any recommendations about factory construction we must first discuss the problems and conditions of ripening, as far as they have been worked out. Factory construction must supply these conditions as closely as possible.

THE NEWLY MADE CHEESE.

Let us first examine the newly made cheese. At 24 hours old, such a cheese commonly contains from 60% to 70% of water. It should contain a little less than 60% after salting is completed and the cheese is ready for the ripening process.

As indicated in the discussion of Table 1., a cheese ready for market contains about 50% of water. During the ripening process, therefore, the cheese must lose about 10% of its weight. In actual practice, the composition of newly made cheeses will vary considerably from day to day under the most careful management. In most cases these variations are due almost entirely to the rate and amount of drainage. The weight of different cheeses and different brands of cheese in the market varies from 10 to 12 ounces. The amount of loss of weight during the entire ripening process varies probably from 8-12% i. e. from 1 to 1½ or even 2 ounces per cheese. Attempts to eliminate this water in the making process have not thus far in our work produced cheeses of the best texture and flavor. The presence of part, at least, of this extra water in the earlier stages of ripening appears to have some necessary relation to the proper development of the ripening agents and to their action.

A ripening process to be successful, therefore, must take into account the composition of the freshly made cheese, the changes of this composition sought in the fully ripe cheese, and the biological conditions under which those changes can be produced. As it comes to the ripening process, therefore, the factors to be watched become very largely biological. The details of handling must be based upon an appreciation of the proper appearance and feeling of the cheese at its various stages of ripening. A brief consideration of the agents of ripening and their several parts in the ripening process must be introduced here.

THE RIPENING AGENTS.

The organisms concerned in Camembert cheese ripening have been discussed in previous papers. Within the cheese, under normal conditions the lactic organisms are always the most numerous species present. Other species in smaller numbers are found in freshly made as well as in fully ripe cheeses. Mazé attributes to the lactic organisms not only the souring of the curd but part of the proteolytic action in cheese ripening. This latter effect is said to begin after other agents have reduced the acidity first produced. Of the other organisms present no species so far studied has shown by its numbers, by the uniformity of its presence, or by its effects when introduced into experimental cheeses, that it bears any important relation to cheese ripening. The souring of the curd and the production of certain flavors by the continued action of particular races or varieties of lactic bacteria are the changes that have been surely attributed by our work to presence of the bacteria inside the cheese.

The processes which transform the curd in three or four weeks from the hard sour undigested condition into the soft, smooth, buttery consistency of ripe cheese, appear therefore to be attributable to the organisms found in the rind, i, e. in the surface ⅛-inch or less. The species present are the Camembert mold (Penicillium camemberti) or its white form (P. camemberti var. rogeri Thom) Oidium lactis and the species of bacteria which with Oidium lactis make up the reddish slime so commonly found upon the surface in the later stages of ripening. Other studies (Dox and Thom*) have shown that the characteristic appearances of ripe Camembert are due to very complete chemical changes of the casein. The fat is little affected. The Camembert mold (P. camemberti) has been shown to produce enzymes capable of causing these textural changes in the required time but not capable of producing the flavors found. Other researches by various authors show that Oidium lactis acting alone is able to cause more or less similar chemical changes but that the texture produced is different. The Oidium, however, is shown to produce flavor which forms part at least of the characteristic flavor of Camembert cheese. This organism forms a considerable part of the rind in all cheeses studied. It penetrates rather more deeply than the regular Camembert mold. Its presence has been demonstrated in the thin white layer commonly seen just under the rind of old cheeses. Together with the several species of bacteria it is found also in the reddish slime of which it is always a part.

The part played by the several species of bacteria found in this slime, in cheese ripening has never been fully worked out. The presence of the reddish slime, covering or partly covering the cheese in its later stages of ripening is found generally associated with the presence of excellent flavors and textures. So close is this correlation, that the presence and proper development of the red color is a common basis for judging cheese in the factory and market. Excellent textures can be found however, in cheeses, entirely lacking the slimy covering, but such cheeses are either mild in flavor or at best lack uniformity. Without proving its exact function in the process, the presence of the slime is certainly associated with, or is a result of the conditions under which the best cheeses ripen.

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*The fuller discussion of these organisms is found in bulletins 82 and 109, Bur. Anim. Ind. U. S. Dept. Agr.

Mazé attributes to the organisms of the rind (molds and bacteria together) the neutralization or destruction of the acidity of the curd and considers their proteolytic action, although admitted to be present, undesirable in character, therefore to be kept as small as possible. This view of cheese ripening attributes the production of ammonia to the organisms of the rind, together with minute amounts of substances which give flavor to the curd. The ammonia is said then to neutralize acidity and assist in dissolving the casein but the bacteria inside the cheese are regarded as the chief agents of the best ripening. Aside from this the organisms of the rind are said to form a necessary protective coating which prevents the access of the air to the cheese and so prevents the odors and flavors of rancidity.

Several species are shown, therefore, to be present in all cases. The exact determination of the part each plays in the ripening of a cheese, is not fully known. Cheeses can be ripened to approximately the same appearance while differing markedly in the balance maintained between the various species. It is most probable that the result is more or less composite in every case. Certain conditions are, however, very definitely indicated by a predominance of particular species. A particular flavor and texture such as has been obtained with considerable uniformity by the makers of certain brands, represents a fairly uniform balance of the activities of these organisms due to uniform handling by makers and dealers for long periods of time.

OTHER MICROORGANISMS.

In addition to the organisms necessary to ripening, a large number of species of molds, yeasts, and bacteria are constantly found. The essential species are always found upon good cheese but almost never without more or less admixture of species unnecessary or even very objectionable. Some of these change the appearance of the cheese; others produce odor or flavor. Some, for example the yeasts, may be present in immense numbers without appearing to exert any marked influence upon the ripening process.

The presence of these various species and possible damage from them must be kept in mind in every discussion of the handling of milk and milk products.

CONDITIONS OF CHEESE RIPENING.

The conditions of ripening must permit the proper development of the organisms sought, yet maintain such a balance between their activities that the cheese when ripe will satisfy the trade. Three factors affect the activity of the molds and bacteria during the ripening process. (1) the initial percentage of water present in the cheese, (2) the temperature of the room, (3) the relative humidity of the atmosphere.

(1). As noted already, cheeses are usually drained to a little less than 60% water during the making and salting process. No two lots drain to exactly the same percentage of water but tests of cheeses which resembled as closely as possible those seen made in the factories show the cheeses to contain about 10% more water at the beginning than at the end of the ripening. The cheesemaker must be able to judge by the feeling of the cheeses how closely they approach such an average condition. When above or below the average in water content special care would be needed to obtain the best results. Comparison of various makes of cheeses indicate that particular factories or groups of factories maintain fairly close conformity to one ideal; other factories or groups set the ideal somewhat higher or lower. The resulting cheeses, therefore, as found in the market show the differences of their handling by contrasting textures, appearances and often more or less intense flavors.

(2). Temperature. Factory observation and experiments agree in fixing the best limits for work at 52° to 58° F. (12-15° C.) Although many factories in France make little provision for artificial heat, these limits would include the larger part of the practice where temperature is controlled. If the rooms are colder development is delayed without advantage. If the rooms are much above 58° F., the growth of all the organisms present becomes disproportionately increased, the proper balance between their activities is lost and rapid decay may be expected. The selection of temperature within these limits becomes a matter to be determined by local conditions and the judgment of the maker. The more rapid ripening occurs at the higher temperature. Considerable control of results is therefore possible from small changes in temperature.

3. Relative Humidity. The humidity of the air in ripening rooms is, if possible, even more important than the initial water content of the cheese and the temterature. The per cent. of relative humidity controls the rate of the evaporation of water from the cheese. As the humidity of the air in the room approaches saturation (100%), the rate of evaporation from the cheeses diminishes until a point of equilibrium is reached above which no water is lost, or moisture is even condensed upon its surface. At that point, the vapor tension of the cheese exactly equals that of the surrounding air. This point of equilibrium differs for cheeses of different water content. It is considerably higher for cheeses at 60% water than for cheeses at 50%. In one experiment about 150 grams of cheese testing about 65% water evaporated at the rate of 1 gram per day whereas a similar amount of cheese testing about 10% less, lost weight at the rate of 0.3 gram per day in the same room at a relative humidity approximating 88%. Although the temperature was low, the sample high in water showed marked signs of decay at 10 days under these conditions. A relative humidity of 88% was manifestly too high to handle cheese as wet as this. The other was found in excellent condition.

Cheeses enter the ripening period with about 8-10% excess of water which must be lost during the process. The humidity of the air surrounding the cheeses must therefore be so handled that this excess of water may be removed. Under factory conditions thousands of cheeses are placed in one room. Ventilation must therefore be provided sufficient to carry away large aggregate amounts of water but must be controlled so that the rate of removal shall not cause shrinkage and hardening. The working temperature ought not to be affected seriously by this ventilation.

Too wet. If the relative humidity becomes too high, water gathers in beads and drops upon the walls and ceiling and upon the cheeses, and bacterial growth becomes much more rapid than mold growth. Mold may even be suppressed entirely. Under these conditions, cheeses develop strong odors and tend to liquifaction and decay. Too wet conditions are usually most quickly detected by the presence of loose floccose colonies of white shimmering mold (Mucor Sp.)

Too dry. If evaporation is too rapid, the danger signal is quickly noted by passing the fingers over the edges of the cheeses. Hard knife-like edges show too rapid drying. The cheeses should feel moist, (not wet) to the very edge. Under too dry conditions, patches of green mold appear quickly. Various species of Penicillium will grow upon curd. When the conditions are right, Camembert mold will overgrow most of the useless or noxious forms. When the air and the curd become dryer, this advantage is lost so that the appearance of green patches becomes an evidence of such dryness.

Between the wet and dry limits described, there is considerable latitude in which the results obtained differ greatly with the details of management. The general principles already discussed apply equally to all practices.

Within these limits two extremes of practice may be described. In the one, the humidity of the air is kept approximately uniform so that the fresh cheeses properly drained evaporate somewhat rapidly, but the rate of evaporation gradually falls to a condition of equilibrium by the time the cheeses have reached the proper moisture content. This period should be 2-3 weeks according to the temperature used. During the further ripening, little, if any loss of weight should occur. In such a scheme, a single room is used, the halloir.

In the other, the humidity is kept as high as the condition of the cheeses will permit until the rind with its organisms becomes well established and reaches the desired balance between mold, Oidium and reddish bacteria. This requires, according to its advocates, 10-12 days if successful. Cheeses must be removed from this room as soon, however, as they have reached the proper appearance. They are taken then to the second room or "sechoir" (drying room) where the remaining excess of water is dried out quickly, so that they reach nearly the same condition in about the same time as in the practice first described. The change in water content is differently accomplished however. The latter practice on the whole probably produces stronger flavored cheeses than the former. Between these extremes many variations are practiced. The many differences in texture and flavor in the imported cheeses may be accounted for in such differences of handling.

A detailed discussion of the observations and appearances during the various stages of normal and abnormal ripening will explain many points in the process.

Under normal conditions, a cheese will begin to feel "greasy" in two or three days. Examination of its surface will show some growth of Oidium and often various species of yeast. The normal process of souring if successful, reduces the growth of bacteria (other than lactic species) to a minimum until a later period. By the end of a week in the ripening room, colonies of Camembert mold should be definitely visible; within ten days of ripening, such colonies if undisturbed will assume the grey-green color indicative of ripe conidia. The best practice calls for a thin or somewhat incomplete covering of mold, well distrubuted, however, over the surface of the cheese. While upon the mats, (clayons) in the first room (halloir) this moldy covering is commonly heaviest upon the under side of the cheese if it remains unturned for a considerable time. If allowed to stand on a board during this time the mold will grow so firmly to the wood that the cheese will be broken in removing it.

Frequent turning, therefore, tends to insure well-distributed mold. If a side or any considerable area lacks mold entirely it becomes covered with bacteria and Oidium which make a greasy soft rind and leads rapidly to over-ripeness, bad flavors and decomposition if water-content is still high. On the other hand, if mold is permitted to develop in a dense mat over the whole cheese it produces a ripening of excellent texture but as a rule, one lacking in flavor. Such a cheese is creamy in texture and flavor but is often found to have none of the characteristic flavor of Camembert. The appearance of the heavy moldy rind is objected to by many. The flavors sought seem to be attributable to a combination of the effects of the two molds under conditions favoring the development also of slimy bacteria. Successful ripening must depend upon the balancing of the activities of these organisms. If handled perfectly there is very little if any growth of Camembert mold after the first two weeks. As Dox has shown, after the mold has begun to produce spores there is a rapid escape of the ripening enzyme from the mold into the cheese. Just at this time, the 10th to 14th day, according to conditions, the softening of the curd under the moldy rind begins to be noticeable.

OIDIUM RIPENING.

Upon Camembert curd, Oidium lactis will spread over the surface of a cheese within the first 48 hours in a warm room. If permitted uninterrupted growth, this organism will, inside the first week, produce irregular ridges and wrinkles upon the surface of the mass with a layer of liquified cheese below this. This liquid layer develops a high flavor. The same conditions which permit this rapid development of Oidium lactis favor the development of innumerable yeasts and bacteria upon the rind of the cheese with the Oidium. These bacteria give a yellowish color to the surface and produce strong and often offensive odors.

Such a rind is thin, breaks easily, and peels off, hence must be handled carefully or the cheese is lost. Continued action of the Oidium without Camembert mold may increase the liquid layer but fails to produce a smooth texture to the center of the cheese. The growth of an excess of Oidium indicates either cheese with too high a water content at the start or too wet an atmosphere in the room—even a condition in which a change of air by ventilation causes the deposit of water rather than drying. Oidium is so nearly always present in milk and milk products, that special measures to obtain it do not seem to be necessary. It is associated with the ripening and peculiar flavor of Limburger and d'Isigny as well as Camembert cheese. Experiments and observations in cheese cellars indicate that Oidium will displace Camembert mold in very wet cheeses or in saturated atmosphere, but the proper drainage of the cheese followed by a very gradual evaporation restricts the growth of the Oidium and bacteria more than of the Camembert mold. It is thus possible by control of conditions to obtain any desired balance between the organisms. If this evaporation goes too rapidly or the curd is too dry at the start both of these organisms are so handicapped that the native molds present as spores in nearly all milk, develop—to the injury of appearance and flavor.

Of the other molds that may appear a few require special mention, Roquefort mold (Penicillium roqueforti) is often found on Camembert cheese. When present it gives a bitter flavor to the cheese, offensive to some tastes, appreciated by others. The true flavors of Roquefort cheese produced by the mold do not appear within the ripening time of Camembert. The most troublesome molds are those which give a strongly ammoniacal odor, Penicillium brevicaule and two related varieties. P. brevicaule is recognizable by the yellowish brown patches formed upon the old cheeses. The varieties are both white or slightly creamy in color. Under wet conditions these form cottony patches almost mistakable for Mucors. Under dry conditions, the spores are produced as a white dust or powder on the surface of the rind. Once learned, the odor immediately betrays the presence of these forms. They are very generally present upon the cheeses imported from France.

No practice observed eliminates such molds entirely though they are especially offensive upon cheeses when a heavy moldy rind has been developed. If conditions of ripening are properly maintained the injuries from these other species are at the same time reduced to the minimum.

Green molds do sometimes become very numerous in a factory especially where several lines of work are in the same building. The mold spores are extremely light, and float in the air, and lodge in inaccessible places. These may be reached and carried down by filling the air with steam. When the steam has condensed, thoroughly spraying and washing down the walls and floors will relieve the trouble. The organisms regularly infecting the cheese are not reached by such means however. These are only avoided by strict cleanliness of handling and the rigorous destruction of badly infected material.

The preceding pages present the general results to be obtained and the approximate limits within which the work can be done The working equipment for reaching these results remains to be discussed. Aside from the occasional farm, the factory is the unit of production. In building the ripening rooms, the conditions of cheese-ripening must be furnished. Either upon the small or the larger scale, a great variety of equipment can be utilized. Where small numbers of cheeses were made in France the work was done in parts of dwelling houses or in outbuildings adapted for this purpose. Better equipment and more uniform results begin to be obtained when the output reaches 200-400 cheeses per day which is perhaps the limit of production without the construction of expensive buildings.

The economies of equipment and administration begin to be possible when the number of cheeses reaches 1-2000 per day. The factories built in America have reproduced types of construction common in France. Although large numbers of good cheeses have been made, the work has been attended with many losses which were found difficult to explain. The discussion of ripening conditions already given, points, however, to the probable cause of many of these troubles. The biological factors in cheese-ripening demand that temperature be kept within quite narrow limits and that the relative humidity be kept quite high, perhaps 85%. Without disturbing temperature or relative humidity, provision must be made to evaporate about 10% of water from every cheese. The aggregate is large if we figure that the factory must accommodate at least 20 days make (10,000 cheeses for a small factory) and evaporate at least 1 ounce from each. Air already at 80-85% saturation takes up little water, hence the rate of change of air must be rapid. The climatic factor in ripening is thus introduced. In general this may be stated as follows: if the atmospheric temperature be higher than the working temperature the air for ventilation must be cooled. Cooling raises the relative humidity toward the dew-point (saturation). If on the contrary the weather be cold, the air must be warmed, but in heating, air increases its capacity to absorb water. Since the water is not present in such air when it is introduced into a ripening room, water is rapidly absorbed from the cheeses.

To furnish working conditions, both temperature and relative humidity must average closely enough to the limits of cheese ripening to permit of successful adaptation to the demands of the process.

THE CLIMATIC FACTOR.

In seeking a basis for comparing American with French conditions, a table has been made from published weather reports of both countries. In the published reports, mean temperature and mean percentages of relative humidity are given for each month of the year. The French figures have been selected from various published tables to show the mean temperature and mean relative humidity of the whole region as completely as possible without complicating the table. Extremes of temperature are given in some cases to indicate the most rigorous conditions to be expected, in contrast to the American figures which follow. The American figures are taken directly from Stockman's paper except that the "mean" column was averaged from the monthly mean maximum and the monthly mean minimum temperatures. When possible the number of years recorded in compiling the figures is indicated.

*Stockman W. B. Temperature and Relative Humidity Data. U. S. Dept. Agriculture Weather Bureau Bulletin O (W. B. No. 334.) 1905.

TABLE 30.

Means of Temperature and Relative Humidity for Stations in France and in the United States.

	Caen[1]		Paris[4]		Ecorche-boeuf[3]		L Havre[1]	Rouen[2]	Alencon[2]	Albany, N. Y.				Binghamton, N. Y.				Milwaukee				San Francisco			
Altitude	69 ft.		256 ft.		Near Sea			89 ft.	450 ft.	97 ft.				875 ft.				671 ft.				153 ft.			
Years Observed	15	7	15	7			7	15	15	26			14	8			17	14			78.4	14			
Mean of	°F Temp.	% R.H.	°F Temp.	% R.H.	°F Temp.	% R.H.	% R.H.	°F Temp.	°F Temp.	Temperature Mean	Temperature Max.	Temperature Min.	% R.H.	Temperature Mean	Temperature Max.	Temperature Min.	% R.H.	Temperature Mean	Temperature Max.	Temperature Min.	% R.H.	Temperature Mean	Temperature Max.	Temperature Min.	% R.H.
Jan.	39.9	85	37.2	87.4	37†	88	86	39.9	37.9	23	31	15	80.4	25	33	17	81	20	27	13	78.4	50	55	45	79.7
Feb.	43.7	84.7	40.2	86.2	40–	87	84	41.9	40.8	24	32	16	78.9	23	30	16	80	22.5	30	15	77.6	52.5	58	47	77.9
March	46.2	81.5	44.6	77.0	43†	80	80.7	45.1	44.4	32	40	24	76.9	33	41	25	81	30.5	37	24	77.6	54	60	48	77.5
April	51.1	80	50.3	71.3	47†	78	77.5	50.7	49.5	47	56	38	69.3	45.5	55	36	76	44	51	37	78.1	55	61	49	77.9
May	55.4	81	55.4	71.7	51†	77	77.3	55.6	54 5	59.5	69	50	71.4	57	67	47	78	58.5	62	45	71.2	57	63	51	79.0
June	60.8	80	61.8	74.9	57†	80	77.5	61.5	61.5	68.5	78	59	71.9	66	77	55	77	63.5	72	55	73.4	59	66	52	80.1
July	63.9	80.7	66.0	75.9	61	80	78	65 7	65.7	73	82	64	71.9	72	83	61	74	70	78	62	70.6	59	65	53	84 4
August	63.3	82.4	65.0	76.1	61†	82	79	60.1	64.8	71	80	62	75.7	69.5	80	59	83	63.5	76	51	72.6	59	65	53	85.8
Sept.	59.0	83	59.0	83.5	57	85	81.4	50.8	60.3	63.5	72	55	77.3	62.5	73	51	89	62	70	54	74.4	61	68	54	81.1
Oct.	51.3	86	50.4	87.1	50†	84	83	44.2	50.5	51.5	60	43	79 8	52.5	63	42	92	50.5	58	43	75.6	59.5	66	53	78.6
Nov.	45.7	86	43.2	87.2	43†	85	85	39.5	43.7	39	46	32	80.7	38	45	31	91	36.	43	29	76.9	56.5	62	51	77.3
Dec.	40.3	86	37.0	91.[illegible]	38	89	87	51.6	38.1	26	36	22	81.3	28.5	35	22	76	26.5	33	20	77.4	51.5	56	47	79.7
Mean.	51.7		50.8	80.6					50.9	48 5	57	40	76.2	47.5	57	38		45	58	38	947.	56	62	50	79.9
Highest Temperature					79° to 92°					100° July				96° July, Aug.				100° July				100 June			
Lowest Temperature............					12° to 3°					-24° January				-26° January.				-8° to 25° Nov. Mch.				29° February			

1. Compiled from Annales du Bureau central meteorologique de France 1899-1905.
2. Rept. of Voyage of H. M. S. Challenger 1873-6, Physics and Chemistry, Vol. 11. pp. 202-4.
3. Ecorchebouef is nine miles from the sea, between Rouen and Dieppe. Full data for this station are given by Moureaux in Annales du Bureau central meteorologique de France, 1890, 1.
4. Relative humidity data for Paris are very completely discussed in Annales du Bureau central meteorologique de France, 1880 B. 106.

Caen is near the western edge of the section where the largest amount of Camembert is produced but probably represents a fair average of the working conditions. It will be noted that in no month does the mean temperature fall below 30° F. The lowest average of minima* for any month was 33° F. The mean relative humidity does not fall below 80% while in the 8 busy months, August to April, it is still higher. Ventilation is practically possible by letting outside air enter at open windows at almost any time in the year without introducing freezing temperature or excessively dry air. A small amount of artificial heat will produce the needed temperature at any time. There are but two months of the year when the temperature is too warm for work within the desirable limits already given. The effect of the few warm hours in the middle of the day at other seasons can be offset by closing the windows. The daily range of temperature and relative humidity is often great enough to produce a few hours of very wet or dry atmosphere, some hours quite warm, and some quite cold and even at times freezing. At almost any season, however, the desired conditions seem obtainable by proper control of ventilation with slight heating or liberal use of cold water. Nature has thus furnished the French factory a set of working conditions which require only the opening and closing of the windows and at times a moderate amount of artificial heat.

Compare with these the figures for the American cities listed excepting San Francisco. The averages for September, October and November are close enough in some cases to those given for Caen to suggest success. In December, January, February and March, our relative humidity, at best, falls several per cent below that of Caen while the mean air temperature is 10° to 20° F. lower. San Francisco alone of the American cities given is found to have climatic conditions even approximating those of Normandy. In the regions represented by the other American cities, the mean temperatures from May to September are mostly prohibitive of work because too warm; from September to December they suggest possible success; from December to March mean temperatures and often relative humidity are both low. Not only are the means low but the variations are greater. Cold northwest storms bring conditions much lower and last often a week or more at a time. Factory managers report that such storms mean the drying out and often the ruin of a large part of the cheeses in stock. Such a storm is said to cause the cheese to shrivel up as if in a warm dry room. To obtain working conditions, the outside air must be warmed at least 10° and often 20° to 30° F. In this process its per cent. of relative humidity falls still lower.

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*Given by De Felice in La Basse Normandie.

A problem may be given to illustrate conditions in a ripening-room at Albany under average conditions for January: Mean temperature, 23° F.; mean relative humidity, 80.4%; 1 cu. ft. of air saturated (100% relative humidity) at 23° F., contains 1.488 grains of water; at 80.4%, 1.196 gr. water. The same cubic foot of air heated to 50° F. would hold at saturation (100%), 4.075 grains of water. But as introduced it does contain 1.196 grains. Its percentage of relative humidity is therefore 1.196÷4.076=29.3. If the working temperature were lowered to 40° F. the corresponding figures would be about 40% relative humidity. Such air introduced into the ripening-room absorbs water rapidly until a point of equilibrium is reached. This water comes from the cheeses. It is thus impossible to introduce outside air into these rooms without rapid drying from the lowered relative humidity of the atmosphere. Both the temperature and the relative humidity of the air introduced must be raised within working limits before the rooms can be ventilated without injury to the cheeses.

Instead of free ventilation as in Normandy this air under the present practice must be introduced through the making-room where it absorbs moisture, or ventilation must be reduced until the change of air is nicely balanced by the amount of evaporation desired. No instruments have been found which give a practical and immediate check upon the humidity relations in such rooms. Unless the cheesemaker is extremely careful, unfavorable conditions are detected only after their bad effects have been wrought upon the cheeses.

Binghamton is in the same district as the factories which have made Camembert in New York state. One factory reports success during parts of October and November and at no other season. The relative humidity figures given for Binghamton cover a single year, 1893. A glance at these figures shows that only during October and November, do mean temperature and relative humidity, both, approach the average for Normandy. At any other season the climatic conditions make success only attainable by producing the proper temperature or humidity or both, in the rooms artificially. Factories built for French conditions have actually produced fine results a few weeks of each year, and caused numerous difficulties and losses at other seasons.

This table brings out, therefore, the contrast between the climatic conditions of dairy sections of the United States and those of Normandy. The question remains, can Camembert cheese manufacture be made successful in spite of these conditions? The factory manager already quoted has said: "The Camembert season in America is just about six weeks, October 15 to December 1st." This assumes a factory built and run as it would be in northern France, but it also results from seven years experience with that factory. In that time several hundred thousands of Camembert cheeses were made and sold. Large losses year after year led finally to the closing of this factory which was built and operated originally by a French family who continued to operate a factory in France during the same time and who have done so since this was closed.

Several other companies have had more or less similar experience and abandoned the effort or curtailed the product on account of similar troubles. The partial successes obtained in these factories have been best secured in the two or three autumn months which are indicated by the table as reproducing French climate most closely. Similarly in experimental work at Storrs, Connecticut, excellent results have been obtained in the same months. Aside from this short period, it has been necessary to determine the conditions needed and to produce them or to fail to get good cheeses. When the conditions have been right, good cheeses have been readily obtained. At all other times, experimental cheeses were lost.

Both factory operations and experimental work thus show that unfavorable climatic conditions must be overcome during a considerable part of the year before continued success can be hoped for.

To overcome these difficulties, either the location of the factory must be determined by the presence of the climatic conditions desired, or, the construction of the factory itself must make possible the production of those conditions when necessary. The former would permit Camembert cheese-making in very few if any places in the eastern states; there is however some reason to hope that this would be successful on the Pacific Coast. It is already introduced in the neighborhood of San Francisco. In the eastern states, the factory to succeed must be so built as to enable the cheesemaker to furnish the conditions required, irrespective of outside temperature or humidity.

CONSTRUCTION OF ROOMS FOR CHEESE-RIPENING.

Since French factory construction has failed in America in the hands of experienced Camembert makers from France, some changes are necessary. Such changes must enable the cheesemaker to minimize the effects of sudden and violent changes of temperature during the winter months. (No cheese or very little Camembert will be made from May to August). To produce this effect, two possibilities are open, (1) buildings upon the present plans but thoroughly protected from cold winds, insulated against heat and cold, and furnished with efficient systems of controlling ventilation; (2) factories with their ripening rooms partly or entirely below the surface of the ground and furnished with equally good apparatus for ventilation. Both systems offer advantages. The factories at present built, are successful part of the time. If better protected against changes of weather and supplied with efficient means of ensuring proper moisture conditions, the same buildings may perhaps be used successfully. Without such alterations, they appear to have failed as investments. If correction of their failures is possible, their use would involve the least change of methods on the part of the workmen. If the whole ripening process be put into rooms partly or entirely below ground the exposure to storm would be reduced, the production of uniform temperatures would be much easier and the moisture of the soil would aid in maintaining the desired humidity, but means of producing and controlling ventilation would be equally difficult to manage during a large part of the year. Such rooms if planned should if possible run into the hillside, and have opportunity for ample window space for lighting purposes.

In any plan of construction the apparatus, (shelving, frames, mats etc.) used in the French factories has proved its economy and efficiency.

With either choice of general plan, the space for ripening ought to be divided and arranged to enable the production of a series of conditions within the working limits of cheese-ripening already discussed. The proposal of simply a "halloir" and a "sechoir" may be doubled to advantage. Instead of one very moist room and another quite dry, the same space may very desirably be divided into three or four rooms offering a series of conditions. One of these rooms if the series be in a hillside ought to be moist enough almost but not completely to stop evaporation. From this condition the other rooms may reduce relative humidity somewhat, and the series should have one room approximating the French "sechoir." The dryest room or "sechoir," however must have the humidity of French atmosphere which averages still 83-85% during the working season. This is a very different figure from our 70-80% humidity, which drops much lower yet, when we compensate for the necessary heating of this air before it can be introduced. Such a series should probably range in humidity from 90-92% in the wettest to 80-83% in the driest room. If we study the conditions in a room full of cheeses we should find the air within that room to have higher relative humidity than the air outside. If we take an average mean humidity of 83-5% as the condition in the Camembert region of France the average "halloir" would probably test between 87-90% when filled with cheeses, and at times, higher. To transplant cheese ripening to America, therefore, we must get relative humidities approximating such figures.

STAGES OF RIPENING.

First two weeks: Cheeses enter the 1st. room (halloir) on the third day after making. They usually become sticky with evidence of Oidium lactis and often give the smell of yeast within 3-4 days. In 5-6 days, the white threads of Camembert mold appear as patches on the sides and edges or a light covering mold show traces of colored spores. The colonies of Camembert mold appear as patches in the sides and edges or a light covering well distributed, but they should not form a heavy felt all over. Areas uncovered or only partly covered with mold, should show a marked slimy reddish covering. If the mold forms a heavy felt with the dark color of abundant spores it is called "black" and rejected as not first grade. If the room is too wet, Oidium, yeast, bacteria, and even white piles of Mucor tend to displace Camembert mold entirely. As the humidity is lowered, the activity of the Camembert mold increases proportionately to that of the slime organisms until a condition is reached in which every trace of slime is covered over by felt-like mycelium. Between the very wet condition and the optimum for mold growth, we find the best condition for cheese-ripening. A heavy covering of mold extracts water from the surface of the cheese and makes the rind too dry to permit the growth of the slime organisms. At its optimum, Camembert mold will overgrow any other species which may happen to be present and at the same time dry the rind so that the bacteria and Oidium are much restrained at least. If the moisture conditions are reduced from this optimum, the growth of Camembert mold will be reduced gradually until a percentage is reached at which other molds grow equally well. The appearance of many colonies of common green molds indicates, as a rule that the air of the room, the cheeses, or both, are dry enough for shrinkage of the cheeses to become noticeable also. At the end of two weeks ripening, the rind of the cheese should be well established, and the first traces of softening usually appear.

If the rooms are kept cold, every stage of ripening may require double the amount of time needed at the limits suggested (52-56° or 58° F.). Cheeses low in water content require more time than if containing higher percentages of water.

A series of rooms rather than a single "halloir" offers several advantages. The cheeses made from day to day differ somewhat in condition as they are removed from the making-room. If all go to one room kept at a theoretical average humidity some become too wet and others too dry even where the condition of the cheese which happen to approximate the average moisture content, is satisfactory. With a choice of rooms, cheeses firm and possibly over-hard may be kept under more moist conditions. The wet-cheeses may be in a room with less humidity. Again different markets call for varying ideals of ripening. Mild flavors and fairly firm textures can be obtained by ripening where a gradual but continuous evaporation is maintained. Moister conditions with the consequent development of bacteria and Oidium are associated with stronger cheese. These may be ripened very soft or after ripening is started, spend a few days in a "sechoir" or drying room and come out with firmer texture. The treatment of the cheese should depend not only upon its texture and appearance but also upon the ideals sought. With a series of rooms presenting different but known and controlled conditions one lot of cheeses does not need to be ruined to save others. By moving cheeses from room to room a much larger percentage of good results is obtainable than with less provision for control.

Third week. During the first two weeks little or no changes in the sour curd are noticeable. A piece of litmus paper pressed against a cut cheese will show an acid condition unless at the end of this time when surface layers for perhaps ⅛ of an inch may test alkaline (blue). During the third week the ripening changes usually progress more rapidly, which will be indicated by a softening of the curd just under the rind. The line between sour curd and ripened cheese is a fairly sharp one, as shown by the softening of its texture. The change from an acid to alkaline reaction can often be shown by pressing litmus paper against the cut edge of a cheese. The soft, well-ripened part in such cheeses reacts alkaline (blue). Ripe cheese is occasionally acid in reaction to litmus. It is usually however neutral or alkaline.

When this softening becomes noticeable at the edges of the cheeses, they must be removed from the matting. The mold of the rind tends to grow fast to the wood-strips which cut into the cheese as softening begins. If they are not promptly removed, areas of rind are broken and peel off remaining in the matting when the cheeses are removed.

Ripening on boards. At this time, if further ripening in the same room is desired, the cheeses are placed upon the smooth boards with which the frames and matting are replaced. Where a second room or "sechoir" is used the cheeses now go into this room. Upon these boards the cheeses are turned, usually every day, to secure uniformity of ripening and to avoid losses from adhering to the wood and breaking. At this time the tendency to evaporation and shrinkage in size is very noticeable hence the second room must be watched closely. Fig. 80, p. 314.

Red areas. With the softening period and the constant turning of the cheeses on smooth boards the reddish or yellowish slimy areas increase in size until they often more or less completely cover up the moldy part of the rind. This increase calls for more moist conditions for its full development.

The rate of ripening is closely dependent upon temperature. At the low temperatures, 50-54° F., mold growth is still fairly rapid, but the rate of ripening is reduced. It is possible at about 60° F. to produce cheeses almost completely softened at 21-24 days when at 50-54° F., a cheese may be less than one-half ripe in the same time. Cheeses high in water content (52% or more) ripen most rapidly—when harder—49-50% water—the cheeses can be held at higher temperatures with less rapid softening.

Three to four weeks. Cheese ripened rapidly decay also more rapidly. It is difficult to hold a cheese ripened in 21-25 days for any length of time. In our experiments, rapid ripening has been associated with such rapid decay that a ripening under four weeks has seemed to render cheeses too perishable for successful market handling. Many of our cheeses which became entirely soft in 23-25 days, developed ammoniacal odors and the peculiar flavor which one quickly learns to associate with over-ripeness within 2-3 days after becoming fully soft. On the other hand, where the process has been prolonged to 30 days or more before complete ripeness, the cheese retained acceptable flavor and texture for several days longer.

It is thus possible to reach much the same results in several ways. By making the drier cheeses and ripening at slightly higher temperatures, we are able to reach good flavors and textures in the proper time without quick decay. Making a slightly wetter cheese and ripening at the lower temperature accomplishes the same result in the season of year when such cheeses can be handled. If the fully ripe cheese contains more than 51 or 52% water, decay is quick and complete, as a rule. Between 47 and 51%, the fully ripe cheese is firmer and resists decay much longer.

Ripening in boxes. In factory practice, the ripening is rarely carried beyond the third week upon boards. Very often the boards are not used at all. In such cases, the cheeses from the boards or after they are removed from the matting are wrapped in parchment paper (sometimes also in tinfoil) and put in boxes and the boxes crated. Very few cheeses are as much as half-ripened through, before they are wrapped and boxed.

The stage of ripening at which this is done influences the final product considerably, as a rule. In experimental work it has been found that cheeses wrapped (and boxed) when two-thirds covered with mold (with the mold still white or faintly tinged with green), usually develop the stronger flavors. If the mold is allowed to go further and to cover the cheese completely and become colored before wrapping, the milder flavors are more common. Sometimes tinfoil is used in wrapping cheese. This minimizes evaporation, makes practically a sealed package, in which little or no mold growth occurs and even inhibits some forms of bacteria. Hard cheeses low in water content may in this way be made to soften completely. In general, tinfoil wrapping prevents evaporation, hastens ripening, produces a more nearly liquid cheese, and leads to strong, almost biting flavors. Some consumers prefer such cheeses hence there are brands which regularly supply this demand, but the larger part of the trade does not use cheeses wrapped in tinfoil.

Cheeses can be ripened fully, with excellent texture and flavor upon smooth boards, without wrapping at all. But as they soften they tend to break open and lose shape which makes such ripening impracticable for the factory.

After boxing, the further ripening may be completed at the factory in a special room as described above, or the cheeses are sent to market. In France where the same practice was observed they were sent to the large market at once. Later the purchasers who wished to supply fully ripe cheese in exactly the right condition, unwrapped them and finished the ripening upon smooth boards in a cellar with air nearly saturated and temperature as already described, perhaps 56-58° F.

FULLY RIPE CHEESE.

The proper texture of a fully ripe cheese is a matter of preference. Good flavored cheese—cheeses of the same flavor—can be obtained soft enough to "run" when cut, or with the consistency of moderately soft butter.

WHEN TO SELL.

The time of packing and shipping cheeses should depend upon the closeness of connection between factory and consumer.

In sending cheeses to the general market in France and also in America the practice has been to keep the cheese in the factory until the mold has developed and the cheese has begun to show slime—that is until the softening has begun slightly—perhaps ¼-inch under the rind. The cheeses are then packed and sent to market. In particular cases (for special patrons or special markets) they have been allowed to ripen further. But, in general, the maker has endeavored to get the preliminary stages of ripening properly started, and then the cheeses are sent to the distributing center. Once on the market such cheeses either go to special cellars for finishing, which may be in the hands of the commission man or the actual user as in cases of hotels, cafés, etc., or they may go direct to the retailer and be sold for consumption.

Much observation of the cheeses offered for sale at retail shows that very many such cheeses reach the private consumer less than 1-3 ripe in France.

MARKET.

In America most users of Camembert demand fully ripe cheese. Some prefer it just before complete ripeness—when there is a slight layer of sour curd in the center. A very few ask for cheese with little or no softening. This complicates the problem of handling Camembert. The average consumer or even the dealer has not understood how to handle it at the various stages of ripeness.

The necessity remains therefore for the maker who sends cheese to the general market to send it so long before complete ripeness as to minimize losses from over-ripeness. At the same time to sell fully ripe cheese to the consumer, the maker must ripen as far as he dares before selling. Careful study of the condition of the market emphasizes the desirability of the closest possible connection between factory and consumer.

SHALL THE FACTORY MAKE CAMEMBERT ONLY?

In establishing cheese factories it is generally good policy to combine the manufacture of several kinds of dairy products. The standard of milk for Camembert needs to be somewhat higher than is absolutely necessary for some other work. The ability to utilize all milk in reasonably good condition would save loss caused by refusing a patron's milk which might occasionally be unsuitable for Camembert but could be used in butter or other cheeses. Further, the factory should be able to take the milk throughout the year while Camembert has not been handled to advantage in America during our hot months of summer. Some combination with other uses of milk should make work practicable throughout the year.

COOKED CHEESE.

That Camembert is a very perishable product has been repeatedly emphasized in these discussions. When fully *ripe,* the marketable period is very short, a few days or a week at best and even that time requires low temperature and care. It thus happens that losses in the American market have been large. Many of these losses have fallen directly upon the consumer who has bought the cheese at his own risk in the market and found it too ripe for his taste, or to have some one of the flavors of over-ripeness or too rapid ripening which are objected to by many persons. Experiments show that any cheese which is in condition to be selected by one even casually acquainted with Camembert can be used acceptably in cooking. The cheese need not therefore be entirely lost even though higher in price than the kinds of cheese usually used in cooking.

Several brands of canned or tinned Camembert are obtainable. All are cooked forms of this cheese and suggest the possibilities of preventing loss of stock in this way. In America all soft cheese trade has hitherto been irregular and uncertain. Dealers and makers have suffered from irregularity especially in the demand for Camembert. Cheeses not sold are lost as a rule. Cooking or canning under proper conditions offers a method of minimizing such losses.

SHALL THE FARMER MAKE CAMEMBERT CHEESE?

As a general market proposition, we answer, No. In special cases, such cheesemaking may undoubtedly be developed to considerable advantage. As yet these possibilities have not been fully touched in America. The making and ripening of the cheese in a single[†] household has however been successfully carried on during the past year. The cheeses produced have varied considerably in texture and flavor and all have differed from the imported cheese in appearance. It may be doubted whether the uniformity demanded by the trade at present could be readily obtained when work is done with so small numbers of cheeses. The equipment used cost but a few cents in addition to the utensils already in the home. For ripening, a small zinc-lined refrigerator has proved capable of adaptation to produce approximately the conditions of ripening. With this or similar equipment it has been demonstrated that a busy housekeeper in the intervals of her work can make and ripen Camembert cheeses enough to supply her own family and some of her friends. In this instance the complex problems of producing Camembert cheese were fairly well mastered in a single season. At the same time, it was shown that no losses were necessary in the process because every cheese was eaten in some stage or condition of ripeness. Repeated trials showed that Camembert cheeses either lacking in flavor or too strong could still be utilized in cooking. The value of the materials used was recovered as acceptable food in the family in every case without deficiencies in flavor preventing its use as food. Although this work in its beginnings has cost a disproportionate amount of time for the food actually produced, the housekeeper who has already done this expects to continue to develop this work and to sell the product to advantage in a special market.

[†] by Mrs. W. S. Dodd, East Corinth, Vermont.

Camembert cheese-making has been discussed in this paper mainly as a factory proposition. The production of this cheese for the general market will probably remain so in America just as it has become so in France. It is entirely possible, however, to produce cheeses of this type for home use wherever some member of the family will take the trouble to learn the work properly. The skill and expense entailed are no greater than the demands of many other lines of work already regularly carried on in the household for no larger return. In many special cases production can go farther and very profitably supply the special personal market as many families now regularly supply butter or other products to customers directly.

The cheeses made under these conditions would probably be refused if offered in the general market. The general market requires uniformity among large numbers of cheeses. This would not be reached by putting together the cheeses from a large number of farms so well as if all came from one factory. Where a small number of cheeses is made, control of conditions is more difficult. Cheeses will vary more from day to day.

Such a product requires more care in selling than the dealer can afford to give. Products of this kind must be made for and delivered directly to a special market to obtain satisfaction for either party.

The problems to be met seem new and strange at first. It will take some time to acquire the skill and judgment to work successfully and especially to develop a considerable number of workers with such skill. But this is in no way impossible and there are many situations in which those engaged in dairy work might regularly produce this kind of cheese from surplus milk and add materially to their profits without appreciably increasing their expenses. Like any other line of work worth doing, it must be learned well or it will lose for the investor both the time and money put in. Some market will take hard cheese either good or bad and pay something for it. Soft cheeses, especially Camembert are either good or good-for-nothing in the ordinary market. A family may eat its experiments but not the output upon a larger scale. The conditions of each case should be well considered before Camembert cheese-making is undertaken upon the farm. Under proper conditions, it may be a source of both pleasure and profit.

In the vast majority of cases better results will be reached for the farm by perfecting the control of the production of milk than by attempting to market the milk produced as Camembert cheese. Comparatively few farms can combine these lines of work to advantage.

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Bulletins 71, 82, 98, and 109 of the Bureau of Animal Industry are obtainable from the Superintendent of Documents, Washington, D. C., at 5 cents each. Bulletin 105 at 10 cents.

Other literature. Popular descriptions and brief discussions of Camembert cheese-making are numerous in dairy text-books and journals. A few only of the more important or more recent references consulted in preparing in this paper are listed here.

The chemical literature is reviewed and listed by Mr. Dox in Bulletin 109, Bureau Animal Industry, cited above.

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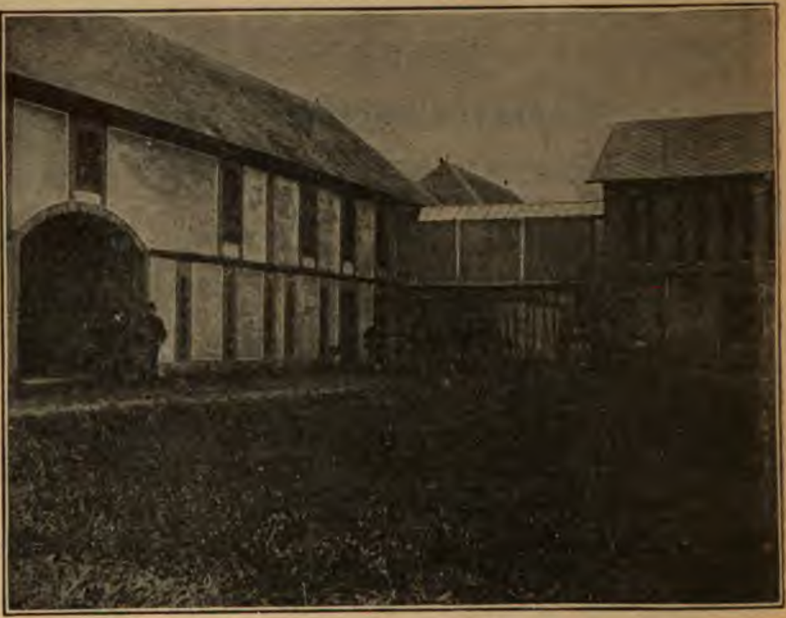

Fig. 77. Factory of M. Rendu, showing the windows opening from floor to ceiling (at right).

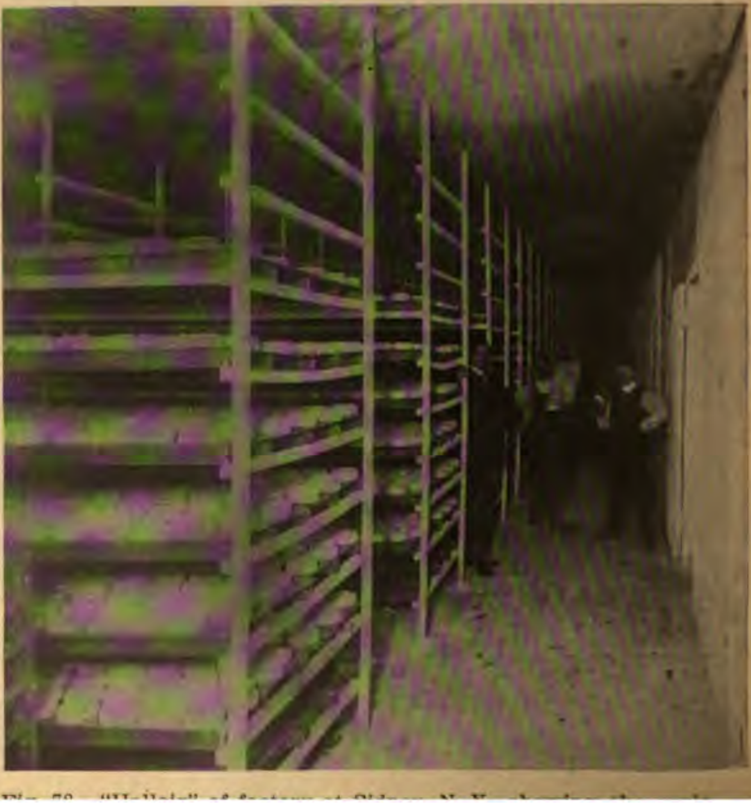

Fig. 78. "Hâloir" of factory at Sidney, N. Y., showing the

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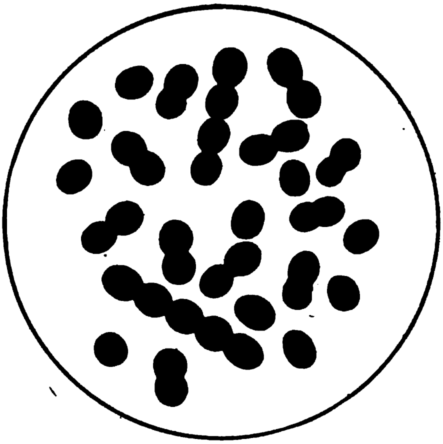

Bacterium lactis acidi (Leichmann) or Streptococcus lacticus (Kruse) magnified 5500 diameters.

BACTERIUM LACTIS ACIDI AND ITS SOURCES.

W. M. ESTEN.

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No. 59. Bacterium Lactis Acidi and Its Sources.

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BACTERIUM LACTIS ACIDI AND ITS SOURCES.

ECONOMIC IMPORTANCE OF BACTERIUM LACTIS ACIDI.

There is only one group of bacteria, namely those that are the agents in preparing, within the soil, the indigestible organic matter for plant food, which is of more importance than lactic acid bacteria. It is recognized that the impassable barrier between organic matter and plant food is bridged over by the work of soil bacteria. The dead roots, leaves and stems of plants and all animal residues are absolutely unusable by plants, until soil bacteria digest these substances into soluble and assimilable materials suitable for the food of plants. Plants grown for economic use are absolutely dependent on certain lower forms of plants called bacteria for their more important food supply. Soil bacteria are therefore probably the most beneficial of all organisms to mankind. Next in importance may be considered lactic acid bacteria which take so important a place in the fermentation of milk and its products.

We may consider the work of this organism under two divisions, the natural and the controlled fermentations. The natural fermentation is governed by a temperature of about 70° to 98°F. The 70° temperature seems to be the most selective for the growth of this organism. A lower temperature than 70° favors the growth of undesirable bacteria such as produce changes which are both offensive and destructive to the quality of the milk. A higher temperature than 70°F. has a tendency to favor the growth of a certain class of bacteria which are called the Coli-aerogenes group. The results of the fermentations of this group are always detrimental to milk and its products.

It appears that nature has advisedly pre-determined that Bacterium lactis acidi should in a way be an agent in preserving so perishable and necessary an article of food as milk. The most favorable fermentation that could occur in milk is caused by this organism. It would be ideal not to have milk ferment, but so long as bacteria exist it is practically impossible to prevent their getting into milk, and if these organisms are present fermentation is always the result. The desirable change which occurs in milk as a result of this lactic acid bacterium is the production of lactic acid from the milk sugar, to the amount of from ¾ to 1% and sometimes more. This amount of lactic acid present in milk precipitates the casein and we have really a pickled milk. This is called sour milk in common language. This organism does not affect the other compounds of the milk such as the fats and salts. Its effect on the casein is to improve the digestibility of this important compound, the meat element, which is the most necessary and most valuable constituent of milk. If this organism were not present in milk all the undesirable bacteria would start fermentation which would result in the destruction of the food elements and the possible production of poisonous substances.

Another apparently providential characteristic of this lactic acid bacterium is the fact that it will grow in the presence of lactic acid to the amount of .65%, while almost all other bacteria are very sensitive to this acid and fail to grow in acidities much above .20%.

Sour milk is supposed by many to be unfit for use as a food on account of its sour taste and changed condition which is offensive to most people. Sour milk is really a more healthful food and digests more quickly and better than sweet milk. A demonstration of this may be found in those people, such as the Scotch and Swiss, who make use of sour milk as a food. These people bear evidence of having a strong constitution. In short, this lactic acid bacterium prevents milk from immediately changing into a worthless substance and causes it to sour. It will keep for a week as sour milk in good condition. At the same time it prevents disease germs and other undesirable bacteria from growing in milk.

This organism is made use of also in artificial or commercial ways. First, in the manufacture of lactic acid; second, to ripen cream for the making of butter; third, to aid in the ripening of cheese. Most of the commercial cream "starters" sold in the market for ripening cream are varieties of Bacterium lactis acidi.

Those cultures on the market that are not Bacterium lactis acidi are so manipulated in the preparation and use of the starter that it causes the Bacterium lactis acidi which is in all cream to grow. The original starter either drops out entirely or acts on the cream in conjunction with Bacterium lactis acidi. Practically all butter made of cow's milk which is not made of sweet cream has the cream ripened by Bacterium lactis acidi. This is the only organism known that produces the right kind of flavor and keeping quality in butter.

In the process of cheese ripening its presence is absolutely essential in the first stages. How much of the ripening of a cheese is caused by the organism is not definitely known. It is admitted by all who know anything about ripening of cheese on a scientific basis that in the initial ripening of a cheese the presence of this organism is essential because it prevents the growth of certain bacteria which would change the cheese, if working alone, to a worthless mass or cause flavors to appear which spoil a cheese for edible purposes.

Lactic acid produced in the cheese seems to favor the work of enzymes originally present in the milk, those added with the rennet, those formed by molds and those probably produced by other kinds of bacteria, especially in certain kinds of cheese. Peptonic digestion requires an acid medium in the early stages of the chemical changes in the ripening of cheese.

Bacterium lactis acidi plays a very important function in its relation to milk and milk products. In milk not properly cared for, it sours it, which enables it to be kept in this condition for some time and to be used for many valuable purposes. In the making of butter with the proper flavor and keeping qualities, also in the preparation of cheese this organism is absolutely essential. From these facts it is justifiable to pay considerable attention to the source of this universally present and beneficial organism in milk.

HISTORY OF ITS DISCOVERIES.

"In the year 1877 Lister, by means of a capillary pipette to which was attached a screw-head so adjusted that he could force out 1-100 of a drop of a diluted solution of milk, obtained the first pure culture of a milk souring organism, which he named *Bacterium lactis*. Lister thus has the honor of being the first to discover and isolate as a pure culture this organism."

Hueppe was also credited with studying this organism, but later examinations of his results prove that he was working with Bacterium lactis aerogenes. He, however, named the organism Bacillus acidi lactici. Some later investigators have isolated and studied his organism and have ascribed to it the entire function of souring milk. The date of Hueppe's investigation was 1884. In 1886

Beyer of Washington, D. C., studied lactic acid fermentations in milk. The morphology of the organism he secured is identical with that of later investigations on this lactic acid bacterium. In 1894 Günther and Thierfelder isolated and studied Bacterium lactis acidi, but erroneously concluded that they had Hueppe's Bacterium. In 1896 the writer isolated this organism and made the same mistake.* Later Leichmann isolated and named it Bacterium lactis acidi which evidently appears to be the most popular name. Kruse has called it Streptoccus lacticus, a name which Professor Heinemann considers the most appropriate.× He further expresses the belief that it is identical with Streptococcus pyogenes. The question is a debatable one and will offer good material for discussion. The writer is not prepared to express any decided opinion, although he maintains one.

There is probably no organism which has received so many different names, by so many different investigators, as this lactic acid bacterium or streptococcus. The confusion, which has arisen, as a result of this multiple naming, has been very annoying. There may be several forms closely related, with differences insufficient to advise a separation into distinct types. Future investigators will probably separate these varieties into a proper classification.† The published results of investigators of this organism have been the cause of much misunderstanding in regard to its name and identification. Nearly every investigator who has apparently discovered it has given it a new and different name. Although the majority have decided that it was a bacterium, some have decided that it was a streptococcus. As a result we find this one organism known by more than a dozen names. The following table will give some idea of this confusion. The writer does not assume to guarantee the absolute accuracy of this table, but he does present it with the idea that it is as nearly correct as can be ascertained within certain time limitations.

*Storrs Agri'l Expt. Station. Report 1896, p. 44.

×The Journal of Infectious Diseases. Vol. III., No. 2, April, 1896, pages 173-182.

†Harding and Prucha, Technical Bulletin, No. 8 N. Y. Expt. Sta. Geneva.

TABLE I.

NAMES OF THE INVESTIGATORS AND THE NAMES THEY HAVE APPLIED TO THE LACTIC ACID ORGANISM.

Investigator	Date	Names Given to Bacterium lactis acidi or Streptococcus lacticus.
Lister	1878	Bacterium lactis.
Beyer	1886	Lactic acid Organism.
Günther and Thierfelder	1894	Bacillus acidi lactici.
Esten	1896	Bacillus acidi lactici.
Dinwiddie	1897	Bacterium lactarii.
Adametz		Bacillus XIX.
Freudenreich		B. acidi paralactis.
Günther		Bacterium Güntheri.
Grotenfeld		Streptococcus acidi lactici.
Kruse		Streptococcus lacticus.
Leichmann		Bacterium lactis acidi.
Marpmann		Streptococcus acidi lactici.
Kozai		Lactic bacterium.
Utz		Lactic bacterium.
Schierbeck		Bacterium.
Weigmann		Streptococcus.

There has been great diversity of opinion as to the morphology of this organism. Authorities with judgment capable of final decision have called it a bacterium, others of equal ability have pronounced it a streptococcus. Some validity for the basis of their decisions are the facts that forms exist, ranging all the way from a true streptococcus to a bacterium proper. It has seemed to the majority of investigators that it was more nearly a bacterium and they have considered that Leichmann's term Bacterium lactis acidi was the best. The weight of evidence is largely on the side of its streptococcal character. The reproduction is streptococcal If in the process of division one axis is expanded more than the other two, there will be a bacterium form in a streptococcal organism. "Elongation for division" then perhaps explains its only relation to a bacterium. As this form is only a transitory character and expresses only a period of its life history or a phase in its growth, it may not be a sufficient reason for removing it from the classification of streptococci.

Does the question of form or morphology, which is very slight, admit of enough diversification to justify the separation of the streptococcus and so called bacterium, when all other characteristics agree? If a form always elliptical shows some physiological character different from the other, then it would be reasonable to call it a Bacterium and place it in a group by itself. The growth of Bacterium lactis acidi in milk is greatly modified from its growth in natural habitats and other culture media. In milk it occurs mostly in elements of two cells in a chain, which are sometimes called figure 8 forms. Chains of not more than five cells occur. It is probable that lactic acid has its effects in modifying the character of chain formation. Professor Heinemann demonstrates that a true streptococcus and this bacterium grow in bouillon with chains of identical form and therefore concludes the two are identical, with Streptococcus pyogenes added, that the three are identical. According to Andrews and Horder, Streptococcus pyogenes does not curdle milk.* Streptococcus pyogenes (bovis) of mastitis is a very different organism from Bacterium lactis acidi.

The illustration on the cover is a photograph of an accurate drawing made by Dr. E. L. Rice. The magnification is 5500 diameters. By careful examination nearly all the forms are noted to be distinctly oblong. Even those in chains of 4 and 5 elements are decidedly elliptical. Two or three single ones are almost spherical and two or three groups of two appear to be nearly spherical.

Sixteen investigators have given thirteen names to apparently the same organism. Five have called it a bacillus, six a bacterium and four a streptococcus. The term bacillus was used before the distinction between bacillus and bacterium was recognized. Those who have called it a bacillus would now recognize that it should be a bacterium, so that eleven have designated it a bacterium against four who have called it a streptococcus.

If it is a streptococcus, is it pathogenic? So far as can be ascertained it is not, ordinarily, as we find it in milk, a pathogenic organism. From whatever original source in the past it has appeared even if pathogenic, it has lost its pathogenic powers when found in milk. This fact is evidenced by the circumstance that all milk and its products have it in small or great numbers, which are consumed every day by practically everybody, without any unfavorable results. Furthermore those products which have it in greatest abundance as buttermilk, sour milk and so forth, are the most healthful of foods. They are healthful because of the lactic acid in them, and the lactic acid bacteria present which prevent the growth in the intestine of putrefactive and other toxic bacteria which cause auto-intoxication. Poisons from these toxic bacteria are absorbed into the system and when combined with incomplete proteid metabolism, the result is headache, rheumatism, gout and a whole train of disagreeable and serious disorders.

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*The Lancet. Sept. 15th and 22nd, 1906.

The source of this organism has engaged the attention of a good many investigators. Prof. Winslow states that it is found on the surfaces of plants and animals. Prof. Heinemann finds it in cow feces and on the surface of the cow.*. Bartel finds it near dwellings and dairies and on the surface of plants. It has been occasionally found in cattle feeds.

In April 1907 the writer commenced the searching out its source or sources to its *real origin,* so far as milk is concerned. The sources studied have been soils, grain and hay feeds, and the surfaces of animals and plants.

ORIGIN OF BACTERIUM LACTIS ACIDI OR STREPTOCOCCUS LACTICUS.

The difficulties in searching for this organism are many, due to its peculiarities, some of which are; slow and meager growth in and on ordinary culture media, small size of the colony, and its small numbers compared with the large numbers of other bacteria associated with it. When it has been plated from the original material in which it is present, it is very difficult to detect on account of liquefiers and other strong alkali producers. For detection there is no more satisfactory medium than litmus-lactose-gelatin which has, however, the one disadvantage of being liquefied with peptonizing bacteria. The alkaline bacteria neutralize the acid produced by this organism in milk sugar gelatin and the liquefiers spread over their colonies so that their presence cannot be determined while large numbers of alkaline bacteria are associated with it on gelatin plates. When growing in milk, however, it seldom encounters any of these difficulties. The vital characteristics of this organism when conditions are favorable are its prodigious power of rapid growth in milk and its production of lactic acid sufficient to kill or paralyze nearly all other kinds of bacteria at temperatures from 70° to 100°F.

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*The Journal of Infectious Diseases, Vol. III. No. 2, April 1906, p. 182.

Methods of research have been to inoculate the materials or cultures from objects into sterile milk, with the endeavor to incubate this organism out from other kinds always associated with it. Along with this *"incubation method"* platings of these materials have been made. The placing of materials directly into sterile milk has been called the "incubation method." This depends upon the power of this organism to develop at about 70°F. at the expense of the power of growth of other organisms due to the production of lactic acid which is inhibitive to almost all kinds of bacteria.

METHODS OF TESTING FOR PRESENCE OF BACTERIUM LACTIS ACIDI.

In the "incubation method" when the milk has curdled, the test-tube is tilted till the surface has run along the side of the tube and exposed the contents near the bottom. This is the place where the organism of the Bacterium lactis acidi type works and frequently the milk will be curdled here, when it is not, when gas organisms are at work, at the surface. With a sterile platinum loop a portion is removed from the bottom of the test-tube, placed in sterile water for proper dilution, and plated in litmus-lactose-gelatin. The colony of this organism on gelatin is very characteristic and can be quite easily detected after experience in examination of it. A second very characteristic test is to inoculate sterile litmus milk with this organism. The first change to appear is the loss of the litmus color except a thin disc at the top which soon turns acid. The milk then curdles perfectly smooth and consistent enough to remain in the tube when inverted. No further change occurs in the character of the curd. A drop or two of clear whey sometimes collects on the surface which presents a concave meniscus. The pink lozenge-like disc increases in thickness as the time goes on till in about three weeks the whole milk has turned pink. The cause of this phenomenon is probably due to the fact that the actively growing bacteria take out of the medium whatever causes the color of the litmus to show. It may be the lack of oxygen. When litmus gelatin is sterilized the color often disappears entirely except at the surface. But the color appears when the gelatin is plated. The above reaction in litmus milk does not occur, so far as the writer is aware, with any other organism. The further tests are microscopic, gram stain, and specific details of analysis. The two most determinative and diagnostic tests are litmus-lactose-gelatin colony, and litmus milk fermentation.

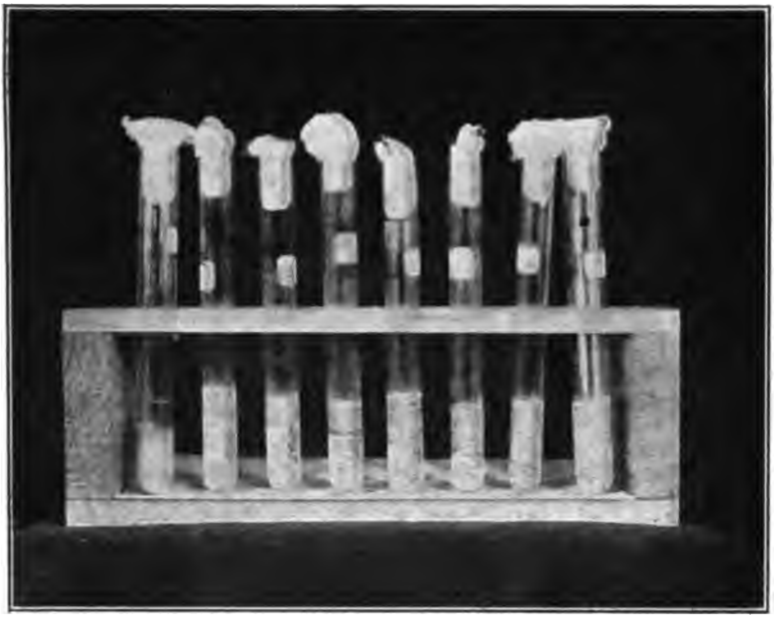

Fig. 1. Litmus milk cultures of Bact. lactis acidi. The test-tube of milk at the left has just curdled. Each test-tube to the right has curdled two days before the one to its left. This means that the test-tube at the extreme right has been curdled 14 days, the next one 12 days and so forth.

SOURCE OF BACTERIUM LACTIS ACIDI.

SOILS.

Twenty-four different kinds of soils have been examined in this work. The variety of soils has been as wide as possible, ranging all the way from barren to the most fertile, from swamps to highlands, from wooded areas to open cultivated fields. The "incubation method" and plating for numbers have both been used. The milk tubes inoculated directly with the soil have invariably shown strong gassy fermentations, separation of clear whey and furrowed and tough fragmented curd. In no instance has the presence of Bacterium lactis acidi been detected. So the results in this line of investigations have been entirely negative. Even pastures frequented by a herd of about twenty-eight cows showed no evidence of its presence. Soil of gardens near buildings gave negative results. Soils near creameries and dairies were not tested as it is known this organism is present in these localities.

HAY.

During the entire winter exhaustive tests were carried on with hay of all kinds and from all parts of a large hay storage. The experiments were commenced on October 1906 and continued to May 21st 1907 with a total of twenty-eight tests. The samples were taken each week during the fall, winter and spring. The twenty-eight samples were composed of seven rowen, seventeen English hay, two swamp hay, one clover, and one June-grass hay. The numbers of bacteria from a gram of hay including all the samples varied from 12,500 to 76,700,000, the average was about 16,800,000 per gram of hay.*

Only one sample of the twenty-eight had this organism present, and this was considered to be a chance contamination from the cow stable. The method of taking the samples was as follows: A covered granite dish and a pair of shears were sterilized, these were taken to the hay storage, the surface hay was removed and from this new hay exposed, was carefully taken a wisp of hay which was cut into the dish in pieces about one inch long. The dish immediately covered was taken to the laboratory and five grams were weighed out in a sterile bottle, the hay being handled with sterile forceps. The proper amount of sterile water was added to the bottle, then the bottle was very vigorously shaken to wash off as many bacteria from the stalks and leaves as possible. A cubic centimeter of this dilution was added to melted gelatin and plated. At the same time several pieces of the hay were added to a tube of sterile milk. The fermentation which followed was very similar to that produced by soil inoculated into milk.

*A gram is approximately 1-28 of an ounce.

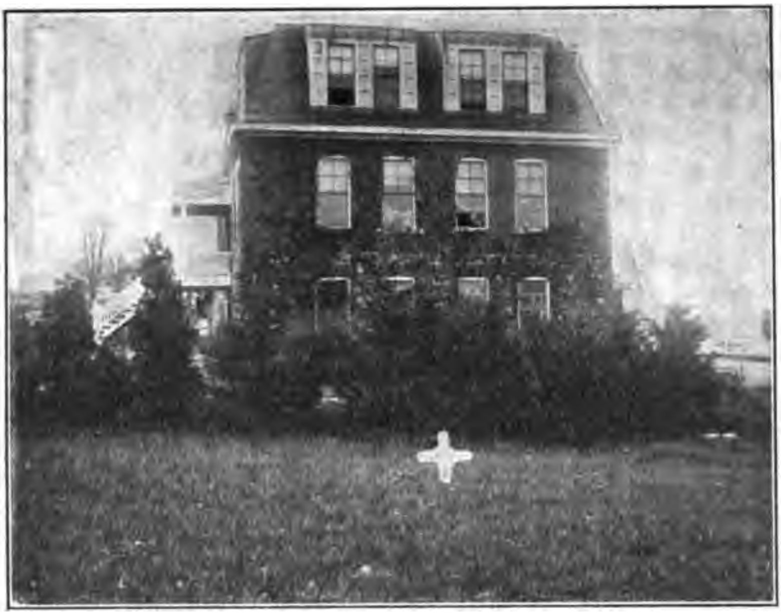

Fig 2., The white cross shows the spot where Bacterium lactis acidi was found on grass. The butter and cheese prepared inside the Agricultural Hall in the rear is probably the source. Grass grown on the same spot under a bell-jar was entirely free from this organism.

EXAMINATION OF GRASS AND LEAVES OF OTHER PLANTS.

The first experiment was interesting. The earliest grass to grow in the spring near the southern side of the creamery was gathered on April 18th and when tested was found to have this organism present. But two weeks later on the same spot new grass grown under a bell jar was almost sterile and contained none of this organism. Grass from pastures and other samples of grass from mowing lots, clover and rye leaves tested in May, showed no evidence of the presence of this organism. Leaves from trees and several kinds of shrubs and garden plants were tested but these also gave negative evidence of the presence of Bacterium lactis acidi. Our investigations so far indicate that this organism does not grow on the above materials examined. If found present it is probably true that the organism has accidentally spread over them from some common source as a creamery or dairy.

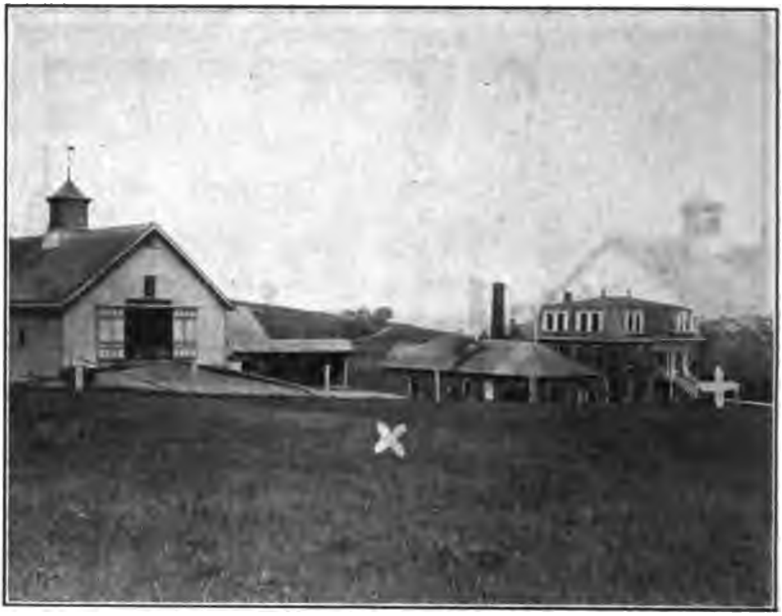

Fig. 3., Agricultural Hall and Dairy Buildings.
×Spot where Bact. lactis acidi was not found on grass.
+Same place illustrated on former photograph of Agricultural Hall.

GRAIN.

The grain feeds were tested similarly to the other materials. Several tests of cotton-seed meal, gluten, bran, middlings, mixed feed and cornmeal were made. Of this list only corn meal contained a lactic acid bacterium. From the materials so far studied none give evidence of supplying this organism in the amounts in which it is actually found or enough to account for its almost constant and universal presence about the cow. The two remaining possible sources are the milker and the cow.

THE MILKER.

Several parts of the surface of the human body were tested, but no positive results were obtained until the inside of the mouth gave evidence of a large colonization. The organisms from this source are not likely to get directly into the milk unless, as has been found in rare cases, some ignorant milker moistens his hands with saliva, a disgusting practice which ought to be punishable by fine or imprisonment or both. The source of this organism in the human mouth is more likely to come from cows milk than any other source.

THE COW.

Some preliminary work was done on the number of bacteria contained in a gram each of horse-curry powder and cow-curry powder. The horse-curry powder contained 18,000,000 and the cow-curry powder contained 207,000,000 per gram of the material. The difference is due to the fact that the cow is never so thoroughly cleaned as the horse. The horse-curry powder inoculated into sterile milk developed the Bacterium lactis acidi as did the cow-curry powder treated in the same manner. There were from the horse 2,025,000 acid bacteria per gram, and 13,000 per gram from the cow.

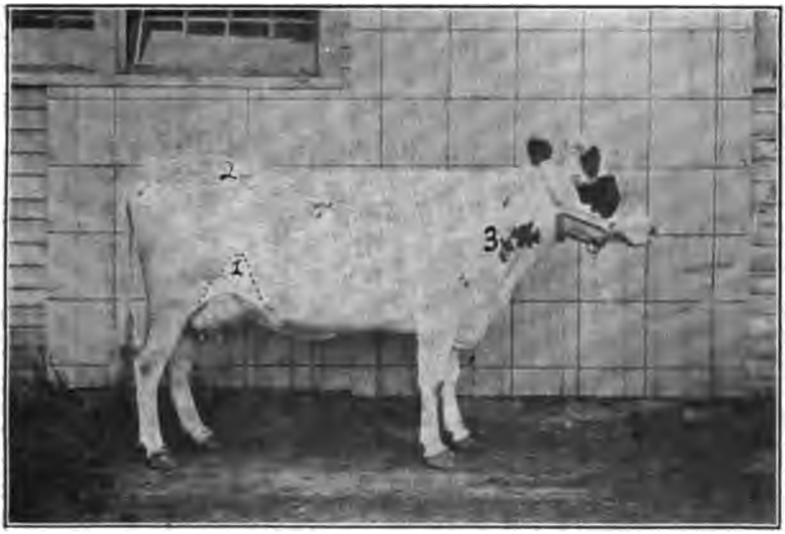

Fig. 4, Snowdrop 2nd of Ste. Anne's.

Illustration to show places where every cow was examined.

1. Outline of inverted udder pocket, inside of which cultures were obtained.

2. Point on the back and 3, shoulder and neck, the other two places investigated.

Special methods were devised for making the remaining experiments. The surface of the cow was tested in three places. First, in what might be called the inverted udder pocket formed by the flap of skin attached to the hind leg and to the flank in front with the udder forming the back. This was chosen as a place likely to be less contaminated than other parts of the cow. Second, in the place between the hip-bone and back bone. Third, at the union of the shoulder and neck middle way from the brisket to the withers. This latter was out of the reach of the tail and would not be contaminated from that source. The parts described are illustrated on page 17.

Cotton swabs were prepared immersed in water and sterilized in test-tubes plugged with cotton. The sterilizing was done immediately before use. The moist swabs were used to twist in among the hairs of the surface of the skin of the cow and immediately inoculated into a tube of sterile milk and set aside for incubation. These swabs were prepared by winding wads of cotton on small sticks placed in test-tubes as indicated in photograph.

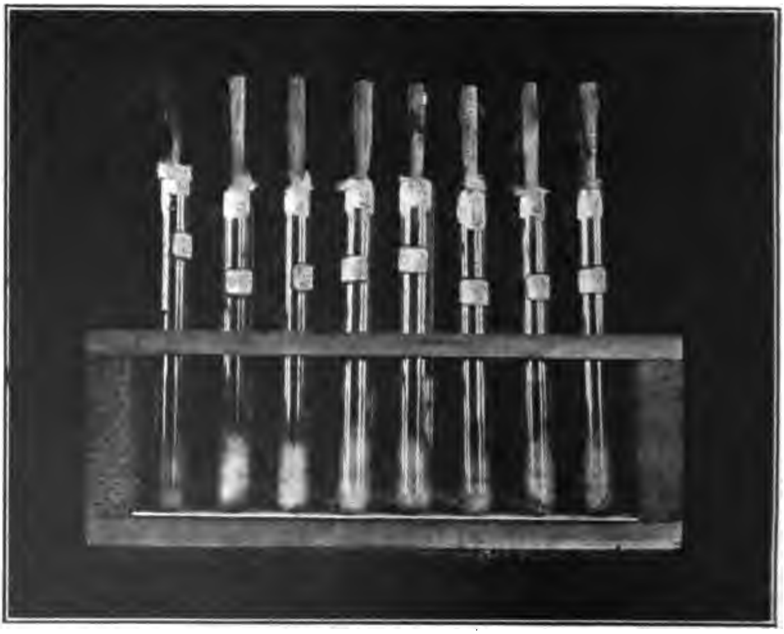

Fig. 5. Swabs prepared for use to explore the surface, the oral cavity and mangers of the entire herd of cows, for the presence of Bact. lactis acidi.

Thirty-four head of stock which included twenty-five cows were experimented on by the "swab" and "incubation method." Each of the twenty-five cows was experimented on in the three places previously indicated. The other members of the herd were investigated in only one place, the point between hip and back bone. The sterile milk, after the inoculation, was placed at a temperature of 70°F. and allowed to remain until curdled. This varied in time from two to three or more days. When the milk had curdled, plates of litmus-lactose-gelatin were made by the platinum loop method from near the bottom of the curdled milk where this organism grows better than at the surface. When the colonies were developed in litmus-lactose-gelatin and could not be positively identified as being this organism, a colony was picked out and inoculated into sterile litmus milk, as its action in litmus milk is more diagnostic than in any other culture test. The first visible change to occur in litmus milk inoculated with this organism is a decolorizing of the litmus with the exception of a thin disc of color at the surface which subsequently turns pink. After this the milk curdles with a uniform solid curd which never changes, while the pink disc at the top gradually thickens until it reaches the bottom of the test tube and the entire curdled milk has turned pink. The whole process requires from ten days to three weeks, depending largely on the temperature. The milk generally curdles in from twenty-four to forty-eight hours.

Some tests were tried by inoculating the swabs from the udder pockets into sterile water in a test tube, and plates were made from this inoculation. As a result of this test on twenty-four cows it was possible to detect in the plates colonies of Bacterium lactis acidi from twenty-one cows.

TABLE II.

No.	Name of Cow. April 8th 1907.	Loop cultures of water from Swabs. Udder Pocket—	Swabs inoculated into milk Udder Pocket—	Swabs inoculated into milk. Back of Cow.	Swabs inoculated into milk. Shoulder and neck.	Positive for each cow.	Negative for each cow.	Number of tests for each cow
		B.a.l.	B.a.l.	B.a.l.	B.a.l.			
1.	Lily Eurotas 2nd	+	+	+	+	4		4
2.	Prehaps	—	+	+	+	3	1	4
3.	Mina	+	+	+	+	4		4
4.	Belle 2nd	+	+	+	+	4		4
5.	Copper Argyle	+	+	—	+	3	1	4
6.	Lily Eurotas Rose	+	—	—	+	2	2	4
7.	Lady Naomi	+	+	+		3		3
8.	Molly 4th	+	+	—	+	3	1	4
9.	Copper Prehaps	+	+	+	+	4		4
10.	Alcyone	+	+	+	+	4		4
11.	Barberry Belle	+	+	+	+	4		4
12.	Butterfly Fancy	+	+	—		2	1	3
13.	Robin Butterfly 2nd	—	+	+	+	3	1	4
14.	Eurotas 2nd	+	+	+	+	4		4
15.	Pietertje DeKol Burke	+	—	+	—	2	2	4
16.	Naomi's Beauty	+	+	+	+	4		4
17.	Spot	+	+	+	+	4		4
18.	Stilleto	+	—	+		2	1	3
19.	Fay DeKol Burke	+	+	+	+	4		4
20.	Snowdrop 2nd of Ste. Anne's	+	+	+		3		3
21.	Molly 3rd	+	+	+	+	4		4
22.	Nellie 2nd	+	+	+	+	4		4
23.	Robin Butterfly 2nd Select	—	+	+	+	3	1	4
24.	Copper Robin Butterfly	+		+	+	3		3
25.	Butterfly Maid	+	+	—	—	2	2	4
	Total Positive	22	21	20	19	82		
	Total Negatives	3	3	5	2		13	
	No Test Made	0	1	0	4			
	Total Tests Made							95

Results of testing the surfaces of 25 cows for the presence of Bact. lactis acidi. + indicates this organism was found, — that it was not found. A blank means that the test was not made.

86 per cent. of the tests were positive.

An experiment to parallel that from the surface of the cow was carried on with feces. Sterile copper wire loops were used to collect the fecal material in such a manner as to avoid as far as possible external contamination. Material from the loops were inoculated into sterile milk. The milk was incubated at 70° until it curdled when loop cultures were made in litmus-lactose-gelatin. These plates showed a majority of acid gas-forming bacteria including a variety of forms such as Bacterium coli-aerogenes and spore-forming acid gas bacteria. In the feces of eleven out of twenty-five cows *Bacterium, lactis acidi* was present, questionably present in six, with no evidence in eight. So that bacterium lactis acidi was present in forty-four per cent. as positive, twenty-four per cent. as doubtful, and was absent in thirty-two per cent. as negative. Of all specimens of Bacterium lactis acidi from feces inoculated into litmus milk only two or three were able to curdle milk, acting as a pure culture, and then only after a long period of time. Thus they showed they were weak and in an abnormal condition for growth in milk, while Bacterium lactis acidi from the surface of the cow was active almost without exception in curdling milk.

COW'S MOUTH AS A SOURCE.

The investigation thus far gives evidence of three sources. Corn meal, cow feces and surface of the cow. Of the first source, corn meal, the numbers were not sufficient to account for the numbers that ordinarily get into milk. Of the second source, feces, the bacteria appeared to be quite different or had been greatly modified in power of producing acid, for they were feeble in this function. Of the third the bacteria were vigorous and curdled milk quickly. The surface of the cow is then an evident source of lactic acid bacteria in milk. But we can hardly imagine that bacteria could grow on the surface of the cow, although it may be possible. There is left but one logical source, namely, the cow's mouth. Certain inferences from former investigations led to this suggestion. The first was the presence of the organism in the human mouth. Gorden has found that the healthy human mouth yields a fluid which contains on an average between 10 and 100 million streptococci per cubic centimeter. Houston even, admits that he has many times found streptococci in greater numbers in human feces than colon bacilli. They were at times present to the number of 1,000,000,000 per gram. Then again finding this organism on the surface of a very young calf was very suggestive. These observations and suggestions led to investigations of the cow's mouth.

It was a very difficult experiment to gain access to a cow's mouth for bacteriological examination. The cow will not voluntarily open her mouth for bacteriological examination by a stranger. The mouth had to be forced open and the cow often showed great fear and agitation. Swabs were used to obtain material around the tongue and teeth. These swabs were inoculated into sterile milk, and incubated till curdled. When plates were made of the curd at the bottom of the second inoculated test tube, a transfer was generally made from the original sterile milk tube to a second sterile milk tube in order to eliminate as far as possible all other kinds of bacteria, the following results were obtained.

TABLE III.

COW'S MOUTH.

No.	Name of Cow.		No.	Name of Cow.	
1.	Molly 3rd	+	12.	Star	+
2.	Belle 2nd	+	13.	Queen	+
3.	Belle 3rd	+	14.	Fay DeKol Burke*	+
4.	Flying Fox's Butterfly	+	15.	Pietertje DeKol Burke	+
5.	Copper Prehaps	+	16.	Clara	+
6.	Prehaps 3rd	—	17.	Fay M. 2d	+
7.	Robin Butterfly 2nd	+	18.	Spot	+
8	Copper Butterfly	+	19.	Snowdrop	+
9.	Copper Robin Butterfly	—	20.	Naomi's Beauty	+
10.	Robin Butterfly, 2nd Select	—	21.	Eurotas 2d	+
11.	Molly 4th	—			
	Positive	7		Positive	10
	Negative	4		Negative	0

Results of testing the presence of Bacterium lactis acidi in the mouth of a herd of cows. 17 positive and 4 negative.

***Died May 26th, '09 from pericardium abcess, caused by a supposed foreign body, nail, needle or hay wire passing through stomach, diaphragm and pericardium.**

From this table it will be seen that seventeen of the twenty-one cows gave a positive test for the presence of Bacterium lactis acidi. From the other four the presence of Bacterium lactis acidi was questionable. The negative results of these four do not prove that the organism was absent but only proves that the test did not show its presence there. The writer has no doubt that a repetition of the experiment on these four would show a positive result. The abundance of the organism in the mouth of the cows was very suggestive. There were also associated with it Bacterium lactis aerogenes and yeasts.

THEORIES CONSIDERED IN THE RESULTS OF FINDING BACTERIUM LACTIS ACIDI IN COW'S MOUTH.

The saliva mixed with the food residue left in the mouth affords an ideal medium for the growth of these organisms. The sugar from hay furnishes the food material they live on, with the presence of proteid which enables them to gain food energy by breaking the sugar into acids. Their presence in feces can be explained by the swallowing of large numbers of these organisms with the food. Whether or not they colonize in the intestines has not been determined.

The tongue of the cow is covered with a lot of sharp cuticle teeth, not unlike a card or curry comb, by which the animal cleans her own body very frequently. By this means this organism is deposited on the hairs, which are the source of this organism on the surface of the cow. This explains why the young calf had this organism on his coat of hair for the cow licks the hair of her calf as faithfully as the hair of her own body. Sometimes cows are tied in stables in such a way that they cannot lick themselves and if they are not turned out very few of these organisms will be found in milk. Unless they pass the alimentary canal without injury to themselves, the fecal contamination dropping from the surface of the cow and from the hands of the milker would be a source of this organism in the milk.

From the results of the experiments on cow feces, lactic acid bacteria from this source appeared to be weak in acid production growing in milk. This may be explained in two ways: First, the organism of this class from feces may be a different variety; second, the passaage of the organism from the mouth through the alimentary canal may change its physiological function. In this passage the organism would be subjected to a variety of digestive juices and ferments some of which might be detrimental to its vitality.

EXAMINATION OF FEED TROUGHS OR MANGERS

If the cow's mouth is the source of this organism then the feeding troughs ought to be well stocked with it. The following experiments were tried to determine this fact. Sterile moist swabs were rubbed along the bottom and sides of feed troughs and inserted into a test-tube, from which it was taken. These were taken to the laboratory and each swab was introduced into a sterile tube of milk. The number of mangers was 36, the capacity of the stable. The milk tubes were placed after inoculation for incubation at a favorable temperature for this acid organism to grow. As each tube was found to be curdled it was slanted and from the bottom part of the tube a loop of material was transferred to a fresh sterile milk tube and incubated. After this second milk tube curdled, it was plated in litmus-lactose-gelatin for the growth of the acid organism present causing the souring of the milk.

The result of this experiment of 36 tests is as follows: The numbers of this organism found were greater than any other source thus far studied except the cow's mouth. There were great numbers of other kinds of bacteria, but the abundance of the lactic acid kind were sufficient to allow their being incubated out from the other kinds. Each of the 36 tests was positive in finding the organism present in the mangers.

SUMMARY.

The soil bacteria are to be ranked first in their benefit to mankind and the lactic acid group of milk bacteria second. Of all the fermentations of milk the lactic acid one is the most desirable. It only changes about 1 per cent of the milk sugar, barely affects the casein besides curdling it, prevents undesirable fermentations, even kills nearly all other bacteria and eventually perishes from its own preservative product, lactic acid, in two or three weeks. The most important phases of its work are; natural souring of milk and cream, controlled ripening of cream, and initial stages in the ripening of cheese. Milk soured by this organism is not injured, but rather improved as an article of food. It is very rare to get milk from a herd or even a single cow that does not contain this organism.

The history of this organism as an agent in souring milk commenced in 1877, when Lister isolated it from sour milk. Since that date a large variety of milk souring organisms have been isolated by different investigators. The results of these investigations indicate that two types of organisms have been isolated; the first a true Bacterium which ferments milk sugar with the formation of CO_2, the second type a streptococcus or bacterium which ferments milk sugar to a pure lactic acid with no gas formation. The investigation further indicates that the first type is not the ideal milk souring organism, but is accessory and the cause of abnormal milk fermentations. The second type is represented by evidently two forms, a typical streptococcus and a more or less questionable bacterium form which appear to differ only in morphology. Opinions are divided and the problem is under debate.

The present exposition of its origin may be a factor to aid in determining this puzzling proposition. If the origin is known it may perhaps aid in classifying this organism. It may be found that two or three kinds of this organism arise from as many different sources. All the sources that afford contamination for milk have been studied, commencing with those most remote to those sources which showed the most positive evidence.

In many instances both the plating and "incubation method" have been used simultaneously. Each method has been a check on the other. The better of the two is the "incubation method." The soils and vegetation in general do not show colonization of this organism. When found on plants or soil it seems to be from animals and animal products. Its presence on the cow and in cow products needs further investigation.

There are conditions when the source of this organism is a secondary one such as occur when milk utensils are never sterilized and become well seeded with this organism from sour milk and milk left on utensils.

The intestinal origin of this organism is probably from the mouth where colonization is abundant. The evidence seems to prove conclusively that all objects which are reached by the tongue of the cow are an abundant source of this organism. The mangers of the cows are the most abundant source besides the cows themselves.

CONCLUSIONS.

1. This organism is not a plant parasite, but if found on plants its source is animal secretion or excretion.
2. Corn products very fully indicate that the organism may possibly exist on this plant. But with the result of the meager investigation this fact is questionable.
3. The cow's mouth is evidently the most abundant source of this organism so far as cow's milk is concerned. From this fact there is strong evidence that colonization is very abundant here.
4. This fact explains how this organism is always present where milk is collected.
5. The organism may be considered as a harmless parasite of the cow's mouth, and possibly of the stomach and intestines.
6. In some cases the source of this organism may be the human subject when unsanitary conditions exist.
7. The organism is not parasitic for man if it is not accidentally introduced through the skin or membrane of the alimentary canal and even then may not be parasitic at all.
8. The mangers and any material that is within reach of a cow's mouth is well stocked with Bacterium lactis acidi.
9. This organism is a favorable one to both milk and to mankind, for milk without it undergoes a very undesirable fermentation and leads the way to the production of putrefaction and poisonous products. This organism and other lactic

acid bacteria are administered in capsules and in milk for the purpose of colonization in the alimentary canal to prevent the growth of anaerobes and other undesirable bacteria. The growth of the two latter is very detrimental to health and the general welfare of humanity.

10. In a general way, bacteria from soil and vegetable origin are alkaline or neutral in reaction growing in culture media. The majority of saprophytic and parasitic bacteria of animal origin are acid in reaction in culture media.

Acknowledgment is made of the efficient assistance of Christie J. Mason for the first part of the investigations and Grace E. Seage for the remainder of the investigations.

STORRS
Agricultural Experiment Station
STORRS, CONN.

BULLETIN No. 60, DECEMBER, 1909.

BACILLARY WHITE DIARRHEA OF YOUNG CHICKS

BY

L. F. RETTGER
Sheffield Scientific School,
Yale University.

F. H. STONEBURN
Storrs Agricultural
Experiment Station.

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The following publications of the Storrs Agricultural Experiment Station are available for distribution, and, so long as the supply lasts, will be sent free to residents of Connecticut who desire them.

No. 14. The Elm Leaf Beetle.
No. 25. The Covered Pail a Factor in Sanitary Milk Production.
No. 28. Dairy Observations.
No. 29. Records of a Dairy Herd for Five Years.
No. 30. Spraying Notes for 1903.
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No. 59. Bacterium Lactis Acidi and Its Sources.
No. 60. Bacillary White Diarrhea of Young Chicks.

REPORTS.

The Reports of the Storrs Agricultural Experiment Station for 1889, 1890, '94, '95, (Part III.), '96 (Part II.), '98, '99, 1900, 1901, 1905, 1906, 1907, and 1908-09, are available for free distribution.

Address all requests to the Director of Storrs Agricultural Experiment Station, Storrs, Conn.

FOREWORD.

Nearly all who have had any experience in the poultry business, though that experience may have been quite limited, have become unpleasantly familiar with the malady of young chicks to which has been given the common name of "white diarrhea."

Judging by the number of letters received by the poultry department of the Experiment Station each year, this disease is common, widespread and the cause of fearful mortality in young chicks. But little définite information was available as to the cause of the disease or the best methods of treatment.

Prof. F. H. Stoneburn, head of the poultry department of the Experiment Station, recognizing the needs of the poultrymen for information, entered into a co-operative arrangement with Dr. L. F. Rettger, in charge of the department of Bacteriology and Hygiene, Sheffield Scientific School, Yale University, for a thorough investigation of the disease. For more than ten years Dr. Rettger has been studying an organism which he has considered as responsible for the disease commonly called "white diarrhea." His studies have of necessity largely been confined to the laboratory, as he lacked the facilities of a practical poultry plant where all the conditions should be under control.

By the co-operative agreement between Professor Stoneburn and Dr. Rettger, the poultry department of the Experiment Station undertook to furnish all the materials needed for conducting the experiment, and to supervise the details connected with incubation. brooding, and care of the chicks under test. The laboratory work has been performed in Dr. Rettger's laboratory at New Haven, and cultures have been made in part from specimens which were packed in ice and forwarded by express, and in part from fresh specimens at the poultry plant here.

While this bulletin is in the nature of a preliminary report, the results already secured are definite and of great importance.

The work will be continued and it is expected that this is the first of a series of bulletins which will be issued on this important subject.

L. A. Clinton,
Director.

BACILLARY WHITE DIARRHEA OF YOUNG CHICKS.

(A Preliminary Report.)

L. F. Rettger, F. H. Stoneburn.

INTRODUCTION.

The practical poultry raiser has many things with which to contend. It is only the exceptional husbandman who is not at times compelled to exert his best efforts to make the business a success. Aside from the questions of feeding, breeding and marketing of the products, numerous problems present themselves. Most important among them are those which bear on the health and vigor of the birds. How to prevent this or that disease from getting into the flock, and how to arrest diseases and epidemics when they have once entered the poultry yard are questions that are of the greatest importance.

In spite of the fact, however, that the field of poultry, particularly chicken diseases, is such an important one, it has been but little explored. It is quite true that fowl cholera has been pretty thoroughly investigated, and that the specific cause of this dread disease has long been known. Numerous remedies and preventive measures have been tried, and some with apparently more or less success.

Gapes is another disease the careful study of which has borne abundant fruit. Avian or fowl tuberculosis has long been an object of scientific investigation. But there are numerous disorders or afflictions about which nothing, or at most very little, is known. Many of these have not even been recognized as distinct diseases, as for example the diarrheas or bowel troubles of chickens.

The term "white diarrhea" has, unfortunately, been used in connection with several distinct kinds of bowel trouble in which the intestinal discharges are of a more or less whitish character. In fact, so much confusion exists regarding this question that considerable effort will be required to satisfactorily adjust the situation.

The inquiries concerning the cause, prevention and cure of "white diarrhea" among the chicks, and the reports of heavy mortality ascribed to this cause which annually reach this Station; the intense interest manifested in this subject at institutes and meetings of poultrymen; the amount of space devoted to it in leading farm and poultry publications; and, finally, our own practical experience with the disease here, all lead us to conclude that "white diarrhea" of chicks is one of the worst things with which the commercial poultry raiser here in New England must contend. The following extracts from a personal letter from an incubator manufacturer, * who has gone to much expense in making an independent investigation of the subject, will give some idea how widespread and destructive the disease has become.

"The writer travelled a great many hundred miles in Pennsylvania, New York, New Jersey and the Province of Ontario. Every farm visited, without exception, where they used incubators, had white diarrhea, with a mortality of ten to ninety per cent. * * * * To those who have not made an investigation of this matter the loss of young chicks from white diarrhea surpasses belief."

Since chicks under three or four weeks of age are but delicate creatures, particularly as regards their digestive system, a slight intestinal disturbance readily makes itself known by the character of the droppings, and frequently by the general appearance of the chick. Any interference with the normal metabolism of chickens usually results in the excretion by the kidneys of more or less chalky matter, which gives the droppings an abnormal character. In view of these facts it seems but natural that many associate "white diarrhea" with one or more of the following alleged causes: debilitated breeding stock, improper incubation, faulty brooding, chilling, overheating, overcrowding, filth, unsuitable diet and poor ventilation.

While these, or some of these alleged causes are responsibile for certain intestinal and other disorders which are accompanied by whitish diarrheal discharges, they are not in themselves able to produce "white diarrhea" as we understand the disease, though they may be contributing factors. In other words there are probably several disorders in which this prominent symptom is apparent, and this in a measure explains the confusion existing among practical poultry keepers and investigators regarding "white diarrhea."

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*Mr. J. L. Nix, Homer City, Pa.

HISTORICAL.

Many investigations, both public and private, have been conducted in recent years as to the probable cause of "white diarrhea." The conclusions have been many and varied, as the above array of alleged causes clearly indicates.

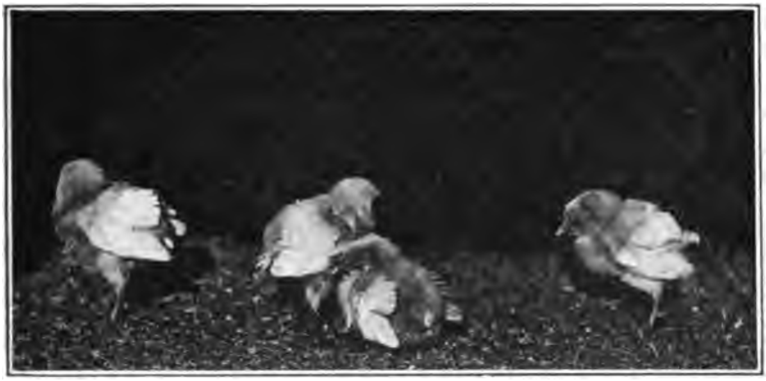

Fig. 6—Ten-Day White Leghorn Chicks Showing Symptoms of Bacillary White Diarrhea.

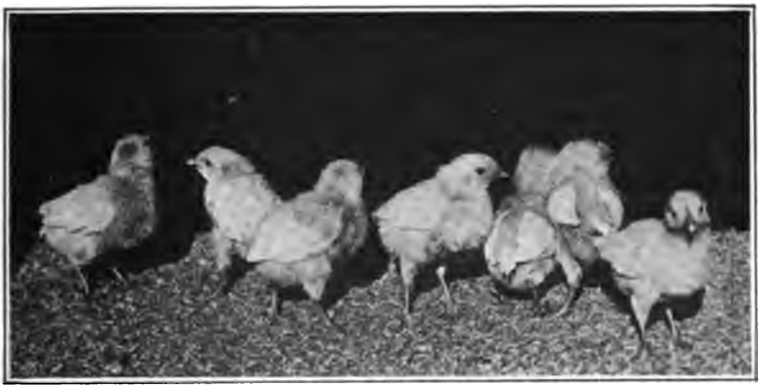

FIG. 7—Normal Ten-Day White Leghorn Chicks.

(The chicks shown in Figs. 6 and 7 were the same in every respect, excepting that those in Fig. 6, were infected through the food supply with *Bacterium pullorum* strain E4. The normal chicks give every evidence of health and vigor, while those in Fig. 6 show many of the prominent symptoms of bacillary white diarrhea. Attention is called to the drooping wings, closed eyes and "short backs," all of which are typical.)

In the previously mentioned communication from Mr. J. L. Nix he informs us that he has never been able to reproduce the disease by artificial means. He writes, "We have used the blood, the discharges, diseased organs, * * * * yet failed to reproduce the disease or cause any inconvenience to the chicks that were infected. *Every symptom, appearance of the lesions, actions of the chicks, lead us to the belief that it is caused by bacteria,* although we have been unable to find them. We note that the chicks have a subnormal temperature of from two to six degrees. They are extremely anaemic, the red corpuscles running very low. * * * * My opinion is that the cause of the disease *or a predisposing factor* is the lack of carbon dioxide principally in artificial incubation."

Mr. L. H. Baldwin, Deer Park, Ont., writes: "I am convinced that the chief cause of 'white diarrhea' is defective incubation, and where the same trouble is found with hen-hatched chicks it is probably due to the same cause. Breeding stock may be weak, **** but it is with artificial incubation that we have the chief difficulty. **** The questions of proper heat and proper ventilation are to my mind what we have chiefly to consider. **** If we will only develop the chick properly and with a vigorous constitution we need have little fear of mortality from 'white diarrhea.'"

Dr. Prince T. Woods, Buffalo, New York, in his admirable pamphlet on "white diarrhea" * says:—"In investigating the causes of so-called white diarrhea there are four general sources of trouble that demand your attention.

First—The condition of the breeding stock from which the eggs for hatching were taken.

Second—Carelessness in selection, handling, keeping and care of eggs intended for hatching purposes.

Third—Faulty incubation.

Fourth—Errors in brooding or feeeding."

At the Ontario Agricultural College, Guelph, extensive investigations have been carried on. Regarding this work Mr. W. R. Graham of the Poultry Department writes:—"The sum and substance of our work has been this, that so far we have failed to prove that it (white diarrhea) is a bacterial disease. *I am free to admit that circumstantial evidence points in that direction,* but we have three or four bacteriologists working upon it and they have apparently failed."

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*"Facts About White Diarrhea."

In a preliminary publication ** Dr. B. C. Morse announced the discovery by him of an organism which he regards as the cause of "white diarrhea." In a large number of so-called "white diarrhea" chicks he claims to have observed a parasite which is identical with *Coccidium tenellum.* This parasite was found by him in the intestines, and particularly the ceca of the infected chicks The coccidium was observed in its encysted stage in the feces, on the walls of the intestines, and to a certain extent in the intestinal epithelial lining.

Dr. P. B. Hadley, of the Rhode Island Experiment Station, also states * that he finds a coccidium in "white diarrhea" chicks, in this case *C. cuniculi,* which is the alleged cause of "blackhead" in turkeys. The encysted stage of the coccidium was never found by him in chicks under one month of age, but he usually saw what is known as the schizont stage of the organism. This is probably identical with the *Amoeba meleagridis* of Smith (1895), which was regarded by the latter as the specific agent of "blackhead" in turkeys. Feeding experiments with the schizont stage of the coccidium indicated that the disease might be spread in a flock through the infection of the food supply.

Results entirely different from the above have been obtained by one of us (Rettger) during investigations conducted in the course of the last ten years. In the summer of 1899 his attention was called to a peculiar ailment affecting hen-hatched chicks two or three weeks old. Within a period of eight or ten days all but three out of a flock of seventeen became sick, eleven of them dying. The mother hen and other full-grown chickens were apparently unaffected. The symptoms and post mortem appearances were uniform, in every way similar to those described later in this publication. (Page 41). A bacteriological examination of the internal organs was made and from the liver and spleen an organism was obtained whose character will be defined subsequently. (Page 44). Inoculation experiments with pure cultures of the organism from the internal organs resulted in a reproduction

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**Circular 128, U. S. Department of Agriculture, Bureau of Animal Industry. 1908.

*"Studies in Avian Coccidiosis," Centralblatt für Bakteriologie, etc., I, Originale, Vol. L, 1909, pp. 348-353.

of the disease and the recovery of the organism from the internal organs. The detailed report of this work was published in 1900.*

During the following summer a disease which in every respect appeared to be the same as the above was brought to the notice of the same observer. This time the epidemic was one of large proportions, occurring on three adjoining farms and involving hundreds of chicks, all of which were hen-hatched. The chicks were attacked apparently and died between the ages of one and four weeks. Of the sick, very few recovered, and the mortality was approximately 80% of the total flock. Grown chickens were again immune.

The symptoms corresponded closely to those of the first epidemic, though the progress of the disease in the larger epidemic seemed more rapid. From the tissues of the dead chicks a bacterium was obtained which in every way resembled the one secured the previous year. Inoculation experiments were again successful. **

Since then several epidemics in Connecticut have from time to time been reported to the same writer, in every case the disease being designated as "white diarrhea." Prolonged and repeated investigations showed that the disease was beyond all doubt the same as that observed in 1899 and 1900. Extended inquiry also revealed the fact that this disease was prevalent not only in Connecticut, but throughout the greater part of the eastern section of the United States and in Canada.

In connection with every epidemic investigated, an organism was obtained from the blood and internal organs which was identical with that found in the previously mentioned epidemics. The symptoms and post mortem appearances were also essentially the same. Furthermore, attempts to reproduce the disease by means of subcutaneous injection of pure cultures of the organism were, as a rule, successful. Several attempts were also made to transmit the disease through food infected with the organism in question, but as these experiments were necessarily carried on in the laboratory on a limited scale the results secured were not fully satisfactory. Full reports of these more recent investigations appeared in 1908 and 1909.*

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*Rettger, "Fatal Septicemia Among Young Chicks." New York Medical Journal, Vol. 71, page 803.

**Rettger. "Fatal Septicemia In Young Chickens." New York Medical Journal, Vol. 73, 1901, page 267.

Though previously designated "fatal septicemia" the term "white diarrhea" was adopted at this time because of the striking resemblance of the disease investigated to epidemics popularly known as "white diarrhea." During the past few months we have submitted to numerous practical poultrymen a list of symptoms which we have observed in chicks suffering from the disease under investigation, and invariably they have pronounced the disease "white diarrhea." This seems to us to be sufficient warrant for the continued use of the name, at least with modifications which will serve to distinguish the particular type of the disease.

One of us (Stoneburn) was associated with this Station as poultryman for about two and a half years prior to the fall of 1904. During that period many chickens were reared annually but there was no evidence of "white diarrhea" being present These chickens were hatched and reared both by artificial and natural methods. From the records available it seems that the disease did not make its appearance here until early in the spring of 1906, when it developed in one lot of 400 incubator-hatched chicks which came from eggs from the Station stock and from stock in different parts of the state. The resulting mortality was practically 100%.** From all available information we judge the disease has been prevalent here from that date.

Upon returning to this Station in the fall of 1908 to resume the poultry work, the attention of the above mentioned was especially drawn to the fact that during the past few seasons "white diarrhea" had been more or less of a scourge on the Station plant and the matter was given very serious consideration in the effort to eliminate the disease. An examination of the breeding stock disclosed the fact that a large percentage of the laying hens were in poor physical condition. After consultation with a number of the leading poultrymen of the state, who inspected the plant, it was deemed advisable to dispose of a large part of the old, and introduce new breeding stock. Accordingly the greater part of the old stock was killed and marketed. On dressing the hens sufficient proof of the wisdom of this course of procedure was obtained, as a large proportion of them showed a pathological condition of the internal organs, especially of the ovaries. A number of the more vigorous specimens were retained as breeders, particularly one pen of Buff Orpingtons and one large pen each of Single and Rose Comb Rhode Island Reds. The new stock included several of the more popular varieties, secured from various breeders, and in each case well developed, healthy, vigorous specimens were selected. In fact, health and vigor were made special requisites. 70% of this stock had been hatched and reared by the natural method.

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*Rettger and Harvey. "Fatal Septicem'a in Young Chickens or 'White Diarrhea.'" Journal of Medical Research, Vol. 18, pp. 277-290.

Rettger. "Further Studies on Fatal Septicemia in Young Chickens, or 'White Diarrhea.'" Journal of Medical Research. Vol. 21, pp. 115-123.

**Storrs Agr. Exp. Station, Bulletin 44, page 25.

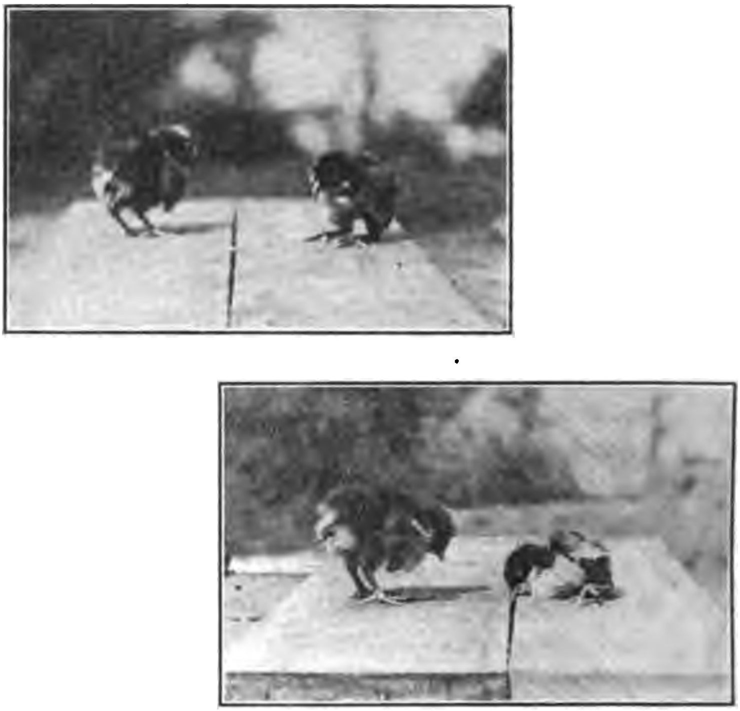

Fig. 8—Chicks Infected with a Pure Culture of *Bacterium pullorum* by Subcutaneous Injection.
(Illustrating some of the experimental work done in 1901.)

The first hatch of chickens for the season of 1909 was taken from the incubators early in February. They numbered about 250, were hatched in incubators of various makes, and in the main came from eggs produced by Station stock. They were placed in the brooder house described in a former bulletin,* were cared for by students, and developed splendidly. A few sickened and died from a disorder which was considered to be "white diarrhea", but the loss was very small. In fact, 90% of the chicks of this lot were carried to five weeks of age when they were removed to other quarters.

Early in March the brooder house was again filled with incubator-hatched chicks, and a disorder diagnosed as "white diarrhea" appeared in two pens, causing quite serious loss. Several of the dead chicks were sent for further diagnosis to the Bacteriological Laboratory of the Sheffield Scientific School at New Haven. The post mortem appearances were similar to those observed in the previously mentioned epidemics, and from the internal organs, particularly the liver, pure cultures of the specific organism—*Bacterium pullorum,* were obtained.

Plans were soon perfected to carry on extensive co-operative experiments as announced by Director Clinton on page 32 of this bulletin.

It was decided at the beginning of the investigation to apply the term *"Bacillary White Diarrhea"* to the disease with which *Bacterium pullorum* is associated.

SYMPTOMS OF BACILLARY WHITE DIARRHEA.

As in many other diseases, the symptoms may vary within certain limits in the individuals affected. We do not wish it to be understood that all of the following symptoms will be observed in every chick suffering from bacillary white diarrhea; but almost all of them will be apparent in the epidemics of any considerable size.

The earliest deaths may occur within a very short time after hatching, without any prominent symptoms, excepting perhaps, weakness and lack of vitality. The characteristic whitish discharge from the vent soon makes its appearance in the flock, the time depending, without doubt, upon the virulence of the organism and the mode of infection. The discharge may be slight or profuse, in color white or creamy, sometimes mixed with brown. The voided matter has a more or less sticky or glairy character. It may

*Storrs Agr. Exp. Station. Bulletin 33.

simply streak the down below the vent or may cling to the down in sufficient quantity to seal up the vent. This is the condition that poultrymen designate as "pasting up behind."

The chicks soon become listless and sleepy, inclined to huddle together and remain under the hover much of the time. They seem to lose appetite and do not eat much. Frequently when they attempt to take food their action is more or less mechanical. The wings begin to droop or project slightly from the body, with feathers ruffled. In acute cases the eyes are closed and the chicks become indifferent to everything that goes on about them. Many of the chicks peep or chirp constantly, the sound being shrill or weak according to the strength of the individual. Frequently when endeavoring to void the excreta the chicks utter a shrill twitter, apparently a cry of pain. The breathing may be labored, the abdomen heaving with each breath. Occasionally one may note a certain amount of gasping or gaping.

During the progress of the disease the chicks may die suddenly while still fairly strong. When the disease is prolonged the chicks gradually waste away, becoming weaker and weaker until they are scarcely able to support their own weight. In this stage they will often be seen to rest against foreign objects for support, standing with legs braced apart, squatting or lying utterly helpless.

Frequently the chicks take on the appearance which poultry men call "short-backed." The back seems to shorten and the abdomen to protrude out of proportion, causing the chick to look "stilty" as compared with one of normal development. This condition Woods accurately describes as follows:—

"The weakling is almost always big-bellied, the abdomen protruding to the rear so that it bunches out behind, well out of line with the vent, with the result that the chick looks as if the tailpiece and backbone had been pushed forward and in just above the vent."

With few exceptions, deaths from typical bacillary white diarrhea occur while the chicks are under one month of age. After this a few straggling deaths may be expected, and if complications set in, a high mortality may be observed. The chicks which have had bacillary white diarrhea seem to be greatly weakened in constitution and fall an easy prey to disorders which would be easily resisted by normal chicks.

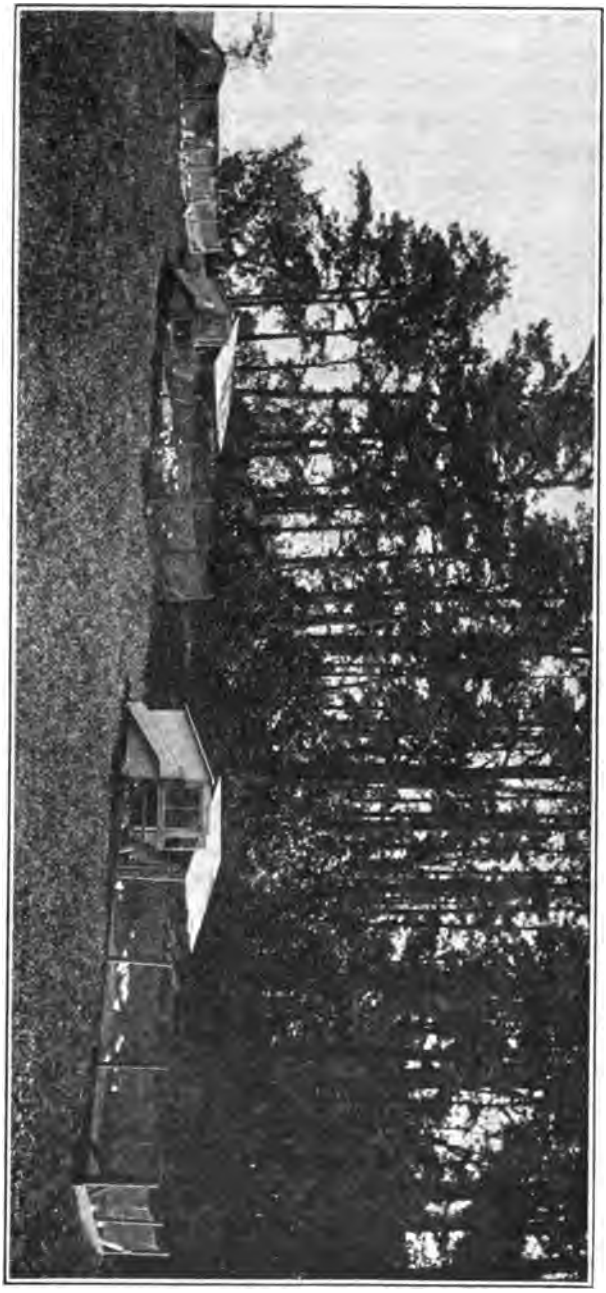

Fig 9—Infection Experiments.
(Conditions under which infection experiments were carried on using outdoor brooders and portable yards.)

Those which survive remain more or less stunted in their development. Frequently they are misshapen, with long beaks and "crow heads," and with imperfect feathering. In every way they impress one as being weak and lacking in vitality. This condition may persist indefinitely, or the bird may slowly regain vigor and vitality and finally make fairly satisfactory development.

POST MORTEM APPEARANCES.

The usual method of autopsy has been followed here, the bird being placed on its back on a board, the outstretched wings and legs tacked in position, the skin covering the breast and abdomen removed and the internal organs exposed to view by the removal of the entire breast bone. In typical cases the following conditions are found:—

Crop—Empty or partially filled with slimy fluid or with food.

Lungs—Apparently normal. (Tubercules not observed).

Liver—Pale, with streaks and patches of red. These apparently slightly congested areas are usually large in size.

Kidney and Spleen—Apparently normal.

Intestines—Pale, and for the greater part empty. A small amount of dark grayish or brownish matter frequently present.

Ceca—With few exceptions but partly filled with a grayish soft material. Only occasionally cheesy or firm contents.

Unabsorbed Yolk—Usually present, varying in size from a pea to a full-sized yolk. The color may vary from yellow to brownish green or nearly black. In consistency there is also much variation. It may appear perfectly normal, distinctly gelatinious, or watery. Frequently it is observed in the character of custard and again more or less dry and firm. Unless the chick has been dead for some time the yolk is usually not found putrid, but merely stale.

The chick as a whole appears more or less anaemic and emaciated. The muscles of the wings, breast and legs may be almost completely wasted away.

DESCRIPTION AND GENERAL CHARACTERISTICS OF BACTERIUM PULLORUM.

MORPHOLOGY, STAINING PROPERTIES, ETC.— The organism is a long, slender bacillus (.3-.5 μ x 1-2.5 μ) with slightly rounded ends. It usually occurs single, chains of more than two bacilli being rarely found. It is non-motile, non-liquefying, non-chromogenic and facultatively anaërobic. In its microscopic appearances it resembles the bacillus of typhoid fever. It is stained readily by the ordinary basic anilin dyes. It does not stain by the Gram method; neither does it retain its color when treated with dilute acetic and mineral acids. The organism does not produce spores, or at least they have never been observed.

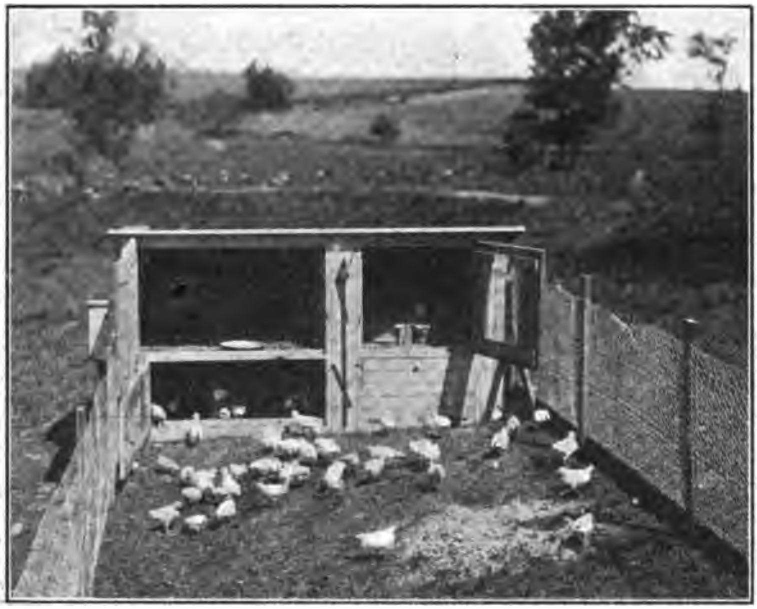

Fig 10—Type of Outdoor Brooder Used in Infection Experiments. (This brooder is original with us, and was especially designed for this work. It is practically a portable brooder house, with hover chamber, feeding chamber, open-front exercising room, and heater and storage compartment.)

Frequent attempts were made to demonstrate the presence of polar granules, but no definite conclusions could be drawn. On one or two occasions, when the staining was done with dilute carbol fuchsin, the organism seemed to be stained more deeply at the ends than in the centre.

The maximum temperature (moist) is 56 to 57° C. for an exposure of fifteen minutes. The optimum temperature is 35 to 37° C.

CULTURAL CHARACTERS.—*Agar plates.*—Small white colonies make their appearance within twenty-four hours. They increase in size slowly and seldom attain more than one millimeter in diameter, even after three or four days' incubation. Under the microscope they appear yellow and vary in form, oval, spindle-shaped or round. The surface is usually marked with one or two rosette figures.

Slant agar.—Growth is quite visible in twenty-four hours, and resembles that of the typhoid bacillus. It spreads little and remains delicate even after prolonged incubation. On glycerine agar the growth is practically the same.

Gelatin plates.—Small white colonies may be seen in forty-eight hours. They remain small for several days, and only under exceptional conditions do they develop into characteristic surface colonies which to a certain extent resemble the grape-leaf colony of B. typhosus.

Gelatin stab.—A delicate growth occurs in forty-eight hours along the whole line of inoculation. It is of distinctly granular appearance and spreads very little on the surface. The gelatin is not liquefied.

On *potato* development is very slow. A narrow, almost invisible streak is produced along the line of inoculation. In *litmus milk* little or no apparent change occurs within the first forty-eight hours, after which the milk becomes slightly acidified without any signs of coagulation of the casein.

Gas production in sugar bouillon.—Negative results were obtained with maltose, lactose, saccharose, inulin, and dextrin bouillon. Dextrose and mannite were attacked, however, with both acid and gas production. In the dextrose fermentation tubes about twenty per cent of the closed arm was filled with gas, and the mannite tubes averaged about the same. The gas consisted of CO^2 and H in the ratio of 1:3. Some of the strains do not produce gas in any of the sugar media, though acid production is quite apparent.

Indol and nitrate production.—Neither indol nor nitrite could be detected in Dunham's peptone solution at the end of one week's growth in the incubator.

Action of certain disinfectants.—Exposure to the following agents was made in ordinary bouillon for two hours at 37° C. The organism was killed by corrosive sublimate in the strength of 1:60,000; carbolic acid, 1: 220; and formalin 1:700.

SCOPE OF PRESENT INVESTIGATION.

It was evident that a thorough investigation of bacillary white diarrhea would involve many and varied experiments. It was deemed advisable to limit our investigations at first to the following topics:—

1. The original source of infection by *Bacterium pullorum*.
2. The possibility of transmission of the disease through the food supply.

THE ORIGINAL SOURCE OF INFECTION BY BACTERIUM PULLORUM.

Several possibilities as to the original source of infection immediately present themselves:—

Infection of chicks after hatching.

Infection of eggs in the incubator.

Infection of the egg shell during its passage through the cloaca or contact with foreign objects, such as nesting material, soil, hands of attendants, baskets, egg trays, etc., and subsequent passage of the organism to the interior of the egg.*

Infection of the egg during its passage through the oviduct or during process of shell formation.

Infection of the egg in the ovary.

During the course of the investigations we were fortunate in having an abundance of material at hand, and hundreds of bacteriological examinations were made. As a large number of the chicks hatched from eggs produced by the previously mentioned Rhode Island Red hens died from a disorder having the prominent symptoms of bacillary white diarrhea, and bacteriological examination of the internal organs of such chicks yielded pure cultures of *Bacterium pullorum* in a large percentage of cases, we decided to pay special attention to a study of these birds and their eggs. Many eggs from various other varieties were also examined, but our most striking results were secured from the Rhode Island Reds.

BACTERIOLOGICAL EXAMINATION OF SHELLS OF FRESH EGGS.

In July a thorough bacteriological examination was made of the exterior of the shells of twelve eggs from Rhode Island Red hens, with negative results. This experiment will be repeated in the future on a larger scale, as we do not consider the results obtained from this number of eggs at all conclusive.

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*See Storrs Agr. Exp. Station Bulletin No. 55—"Infection and Preservation of Eggs."

BACTERIOLOGICAL EXAMINATION OF CONTENTS OF INCUBATED EGGS.

In June eighty-six eggs which had been incubated for longer or shorter periods were examined to determine the presence of *Bacterium pullorum* in the yolks. Some of these eggs were infertile, but the majority of them contained embryos in various stages of development. Of the yolks of the eighty-six eggs examined, eight were found to contain the organism in large numbers and apparently pure, and five were questionable. While this lot of eighty-six eggs came from eleven different varieties of fowls, it was curious to note that all the infected eggs came from two varieties, the Buff Orpingtons and the Rhode Island Reds. There were six Orpington eggs, one of which contained the organism, and twenty-six Rhode Island Red eggs, seven of which contained the organism. There was also one egg from the latter variety in which the presence of the organism was questionable.

On another occasion sixteen eggs were examined, none of which came from the Rhode Island Red hens, and the results were negative.

BACTERIOLOGICAL EXAMINATION OF CONTENTS OF FRESH EGGS.

The twelve Rhode Island Red eggs already mentioned, whose shells were examined for *Bacterium pullorum* were also tested as to the presence of this organism in the yolk. The yolk of one of them contained the bacterium, pure, and in large numbers. This experiment also will be repeated more extensively in the future.

BACTERIOLOGICAL EXAMINATION OF THE OVARIES OF HENS.

The results secured from the examination of the contents of fresh eggs and eggs which had been incubated for longer or shorter periods indicated that infection must occur in the hen and probably before the shell is formed. Accordingly, twenty-three hens were killed and examined. Of this number twenty-one had decidedly pathological ovaries. While the majority of the ova were apparently normal a number in each hen were not. Of those showing abnormal characteristics the very small ones were merely discolored, in shape and consistency resembling normal ova. The larger pathological ova were distorted in shape, many of them appearing decidedly angular, and in texture more or less firm oı cheesy. Many of them were dark in color and more or less mottled.

The ovaries of twenty of the above mentiond hens were examined bacteriologically, and from nine of these birds pure cultures of *Bacterium pullorum* were obtained. The organism seemed to be present in the ova in small numbers, but there is no question at all as to its identity.

After such decided results it was deemed best to make further and, if possible, more thorough examinations. Six additional hens, all Rhode Island Reds, were examined and accurate data were secured regarding the condition of the ova, both normal and abnormal. In no case was the organism found in ova that seemed normal in every way, but from abnormal ova from each hen, pure cultures of *Bacterium pullorum* were secured. In other words, all of this last lot of hens had ova which were infected with the organism under discussion.

The finding of this organism in (a) the ova in the ovaries of the hens, (b) the yolk of fresh egg, (c) eggs incubated for varying lengths of time and (d) yolk sacs of fully-developed chicks still within the shell, appeared to us to be conclusive evidence that the original source of infection of the chick is the hen. Therefore, on poultry plants where bacillary white diarrhea is found, a certain percentage of the chicks have this disease when hatched.

INFECTION THROUGH THE FOOD SUPPLY.*

Before beginning actual experiments in infection of chicks through the food supply it was deemed advisable to ascertain, so far as possible, the extent to which bacillary white diarrhea prevailed upon the Station poultry plant, and the mortality from this cause among the chicks of the different varieties up to the age of four or five weeks.

In the first experiment, 180 incubator-hatched chicks from eggs produced by Station stock, representing ten of the more popular varieties of fowls, were evenly divided into three lots of 60 chicks each and placed in pens in the brooder house. They were fed and cared for according to the system which had given us very satisfactory results during the fore part of the season.

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*At this time we will not attempt to discuss in detail the facts brought out by these experiments, but will merely present a brief statement of the scope and character of the work and the results secured.

The mortality from all causes up to five weeks of age was 23 chicks or 13% of the number under observation.

100 hen-hatched chicks were divided into two equal lots of 50 chicks, and each lot placed in a colony house in care of three hens. The chicks were similar to those in the brooder house, and were given the same general care.

In five weeks the total mortality was 13 chicks, or 13%, but of this number 7 were picked to death by the hens, so the mortality from natural causes was but 6%.

Combining the above figures we find that in these five lots of 280 chicks, representing several varieties, hatched and brooded by both natural and artificial methods, the total mortality to the age of five weeks was 36 chicks, or 13%, and the total deaths from natural causes was 29 chicks, or 10%.

As a whole the chicks developed splendidly, growth being decidedly satisfactory. No marked symptoms of bacillary white diarrhea made their appearance, but 12 of the dead chicks were examined bacteriologically for the presence of *Bacterium pullorum*. In 2 cases the organism was found.

From the above test it seemed probable that though the infection was present on the plant it was not widespread. This statement applies to the Station stock as a whole. Later in the season it was noted that the chicks from the previously mentioned Rhode Island Red hens were not up to the standard of vitality. A large percentage of them developed bacillary white diarrhea. Insufficient data were secured to permit us to present an accurate comparison, but this condition was observed and commented upon by all who had any part in the practical work at the plant.

INFECTION EXPERIMENTS WITH A WATER SUSPENSION OF BACTERIUM PULLORUM.

A lot of 50 incubator-hatched chicks, largely White Plymouth Rocks and Rhode Island Reds, were placed in an outdoor brooder of standard make, and were given the same general care as the preceding lots. When taken from the incubator each chick was given a few drops of a water suspension of *Bacterium pullorum* (strain A), by means of a medicine dropper. The same water suspension was liberally added to the drinking water, and used to dampen a part of the feed.

Symptoms of bacillary white diarrhea soon appeared, the greater portion of the chicks being affected. The resulting mortality in four weeks was 34 chicks, or 68%. The chicks were anaemic and most of them showed typical postmortem appearances. Ten of them were examined bacteriologically, and in six cases pure cultures of *Bacterium pullorum* were recovered, and in one additional case its presence was questionable.

The value of the above experiment is impaired because of the absence of a check lot of similar chicks, and because the flock contained so many of the Rhode Island Red chicks which may have been hen-infected.

In the next experiment an effort was made to secure lots of chicks which were alike in every particular. Since the Station stock comprises so many varieties the number of birds of each variety is limited. Consequently, eggs were purchased from a leading poultryman of the state who was in a position to furnish us with large numbers of fresh eggs of one variety. On his farm the stock consists largely of White Leghorns kept on the free range system.

Apparently the stock on this farm is not seriously infected with bacillary white diarrhea, but we are informed that during each season a number of chicks die with symptoms similar to those of the disease in question.

The chicks were hatched in several different types of incubators, and 180 of them were selected and divided into three equal lots of 60 each. They were placed in new outdoor brooders especially constructed for this work, as shown in Figs. 9 and 10. These brooders were located on ground which had not been used for years as runs for young chicks.

When the chicks were two or three days of age they were taken from the incubator and each was given a few drops of water suspension of *Bacterium pullorum*. Strains A, B and D were used, one for each brooder. Water suspension was also added to the drinking water and two feeds per day were dampened with it.

In the course of a few days some of the minor symptoms of bacillary white diarrhea were noted, but they soon disappeared and the growth of the chicks was excellent. The total mortality in four weeks was 23 chicks or approximately 13%. Bacteriological examination of a few of these chicks gave negative results.

INFECTION EXPERIMENTS WITH BOUILLON CULTURES OF BACTERIUM PULLORUM.

From the above mentioned breeder another lot of eggs was secured, the varieties being White Leghorns and White Plymouth Rocks. The eggs were placed in incubators of various makes, and hatched satisfactorily. From this hatch 396 chicks were selected, divided into six lots of 66 chicks each, and placed in the outdoor brooders.

Three of the lots were infected with bouillon cultures of *Bacterium pullorum,* strains A, B and E being used in different brooders When about twenty-four hours old each chick was given a few drops of the bouillon culture. This material was also used in the drinking water and to dampen two feeds per day for ten days.

The three remaining, or control lots, were kept under identical conditions and fed and cared for in the same manner, except that the organism was not given them. Instead of dampening the food with bouillon culture, plain water was used.

In the control lots growth was satisfactory from the start, with comparatively low mortality. A few died from a disorder diagnosed as bacillary white diarrhea, which probably was the result of infection from the hen. The disease made little headway.

In the infected lots all the symptoms of bacillary white diarrhea were soon observed. The chicks had poor appetites as compared with those in the "non-infected," or control lots, and there was a high mortality.

During the first month the loss was as follows:—

Control lots,	16 chicks,	or 8%
Infected lots,	57 chicks,	or 29%

At one month of age the surviving chicks were weighed, and the controls were found to be 17% heavier than the infected lots.

At eight weeks of age the comparative loss was as follows:

Control lots,	33 chicks,	or 17%
Infected lots,	94 chicks,	or 47%

At this stage the difference in development between the two lots was decidedly marked, as shown in Fig. 11. Both stunted and large chicks were to be found in each lot, but, as a rule, the large, well developed chicks were found among the controls, and the weak and stunted ones in the infected lots.

In about 75% of the dead chicks from the infected lots which were examined, *Bacterium pullorum* was found.

From the last hatch eleven strong chicks were selected and given subcutaneous injections of a pure culture of the organism, strain E. The resulting mortality was 100% and the organism was found in the internal organs of every chick examined.

The next lot of eggs was secured from a breeder in New Jersey who keeps a large number of White Leghorns. The eggs were poorly packed, and many were broken before they reached us. They were placed in incubators of three different makes. The resulting hatch was not satisfactory as regards numbers, but the chicks seemed strong and well developed. Cripples and weaklings were rejected, and the remaining chicks, 210 in number, were divided into five equal lots of 42 each and placed in pens in the brooder house. Each lot contained an equal number of chicks from each incubator, so they were absolutely uniform.

Three of the lots were infected with bouillon culture of *Bacterium pullorum,* strains E2, E3 and E4. In this experiemnt the medicine dropper was not used, but the chicks were infected solely through the water and feed supply, which were mixed with bouillon cultures of the organism. The bouillon culture was supplied in this manner for ten days. The remaining two lots were used as controls.

At this writing the experiment has been under way a little more than two weeks. Noteworthy results have already been obtained. In the infected lots the chicks soon "broke down" and exhibited every symptom of bacillary white diarrhea. Strains E3 and E4 seemed particularly virulent, and the chicks infected with them are dying rapidly.

In the two check lots the mortality has been low and the chicks as a whole are in excellent condition.

During the first two weeks the comparative mortality was as follows:

Control lots,	(84 chicks)	5 deaths or	6%
Infected lots,	(126 chicks)	22 deaths or	18%

At this time the chicks in the control lots averaged 15% more in weight than those in the infected lots, and appeared in every way greatly superior to them. A complete account of this experiment will appear in due season.

The various "strains" of *Bacterium pullorum* used in the above experiments were secured from the following sources:—

Strain A —From chick, Southbury infection, 1907.
B —From chick, New Haven infection No. 1, 1908.
C —From chick, New Haven infection No. 2, 1908.
D —From chick, Rhode Island Experiment Station, 1908.
E1—From chick, Storrs Agricultural Experiment Station, spring, 1909.
E2—From yolk of unhatched, but apparently fully developed chick, Storrs Agricultural Experiment Station, summer, 1909.
E3—From yolk of fresh egg, Storrs Agricultural Experiment Station, summer, 1909.
E4—From ovary of Rhode Island Red hen, Storrs Agricultural Experiment Station, fall, 1909.

SUMMARY.

The group of intestinal disorders in which a whitish diarrheal discharge is a prominent symptom is apparently causing greater mortality among young chicks than any other agency. The consequent financial loss to the poultrymen of America has aroused such a widespread interest as to demand a thorough investigation of the subject. Some work of the kind has already been attempted, but great confusion seems to exist in the minds of the different investigators as to the identity and specific cause of the various disorders with which the above mentioned symptom is associated.

We have selected the name *"Bacillary White Diarrhea"* to designate the particular type of diarrheal disease of young chicks which is caused by the specific agent, *Bacterium pullorum.* This disease has fairly uniform symptoms and postmortem appearances, and appears to be the type which is popularly known throughout New England as "white diarrhea." It seems to be most prevalent among artificially-hatched and brooded flocks, though hen-hatched chicks are not immune.

Although our investigations are far from complete we believe that the data already secured warrant us in submitting the following statement concerning bacillary white diarrhea:—

The mother hen is the original source of infection of the chick.

A certain percentage of the chicks on infected farms have the disease when hatched.

The disease may be induced by subcutaneous injection of chicks with pure cultures of the organism, and transmitted through infected food supply.

The mortality depends upon the virulence and numbers of the organism, the mode and time of infection, and doubtless upon the vitality of the chicks.

While a large percentage of infected chicks die under four weeks of age, some may survive the infection. These are likely to be weak and stunted, and seem particularly susceptible to other disorders.

SUGGESTIONS AS TO POSSIBLE MEANS OF PREVENTION.

Thus far we have not undertaken experiments bearing directly upon the prevention and cure of the disease, but in the light of the results secured from experimental work already done we venture to offer the following suggestions:

1—The poultryman should learn to recognize bacillary white diarrhea both from *external symptoms* and *postmortem appearances*, as other types of diarrheal disorders may require entirely different treatment.

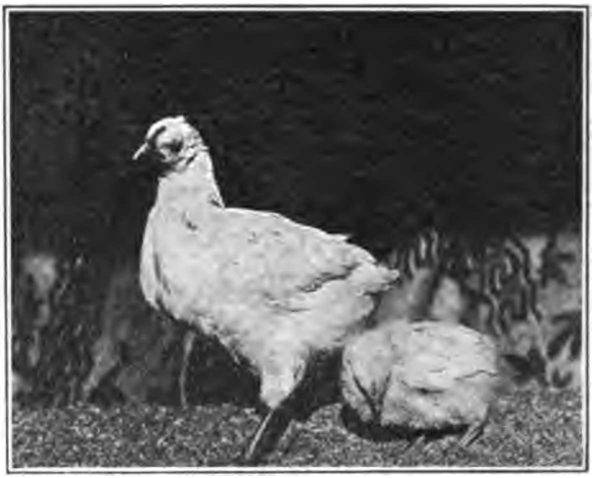

Fig. 11—White Plymouth Rock Chicks Two Months of Age. (The larger chick is a normal, well developed specimen. The other was infected with *Bacterium pullorum* through the food supply, survived the infection, but remained stunted.)

2—If the disease makes its appearance among the flocks of chicks every effort should be made to ascertain the source of the infection. This may be (a) breeding stock upon the place, (b) eggs for hatching secured from other breeders, or (c) newly hatched chicks purchased from others.

If the breeding stock proves infected there are two courses of procedure open; (a) market the entire flock or refrain from using their eggs for hatching, or (b) install trap nests in the breeding pens and by means of accurate pedigree records ascertain which individual hens are producing infected chicks, and remove such hens from the breeding flock.

Since infection may be brought upon the place through purchased eggs or stock, such purchases should be made from farms where bacillary white diarrhea is not common.

3—If bacillary white diarrhea is known to be present on the place steps should be taken to prevent the spread of the infection, and, if possible, to effect a cure. (As to the latter we do not feel justified in offering any suggestions at this time.)

PREVENTION—Since the disease cannot, apparently, be transmitted through the food supply after the chicks have reached the age of three or four days, every means should be pursued to prevent the spread of the infection during this critical period. We suggest:

The segregation of the chicks in small lots during this interval.

Perfect disinfection and cleanliness of brooders or brood coops.

Food and water supplied in such a manner as to prevent contamination by the droppings.

The use in the brooder of a liberal amount of fine, absorptive litter which will quickly cover and seal up the droppings.*

Raise and maintain the vigor and vitality of the breeding stock and chicks by every reasonable means known to the poultryman.

CO-OPERATION.

As it is planned to continue this line of investigation indefinitely we earnestly solicit the co-operation of all poultrymen who are interested in the problem. We desire information concerning epidemics of bacillary white diarrhea or closely allied disorders, and results obtained in efforts made to prevent or cure the disease.

In conclusion we wish to acknowledge our indebtedness to various members of the Station staff, especially Prof. W. M. Esten and Miss Grace E. Seage for their assistance in the bacteriological work, and to Dr. C. D. Jarvis for making most of the photographs which are reproduced in this publication.

*For this purpose we have used alfalfa meal with much satisfaction.

STORRS
Agricultural Experiment Station
STORRS, CONN.

BULLETIN No. 61, JANUARY, 1910.

APPLE GROWING IN NEW ENGLAND.

I—The Apple Industry.
II—Renovation of Old Apple Orchards.

By C. D. JARVIS.

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No. 25. The Covered Pail a Factor in Sanitary Milk Production.
No. 28. Dairy Observations.
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No. 45. The Apple Leaf Miner.
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No. 56. Control of Insects and Plant Diseases.
No. 57. A Study of Some Connecticut Dairy Herds.
No. 58. Camembert Cheese Problems in United States.
No. 59. Bacterium Lactis Acidi and Its Sources.
No. 60. Bacillary White Diarrhea of Young Chicks.
No. 61. Apple Growing in New England.

REPORTS.

The Reports of the Storrs Agricultural Experiment Station for 1889, 1890, '94, '95, (Part III.), '96 (Part II.), '98, '99, 1900, 1901, 1905, 1906, 1907, and 1908-09, are available for free distribution.

Address all requests to the Director of Storrs Agricultural Experiment Station, Storrs, Conn.

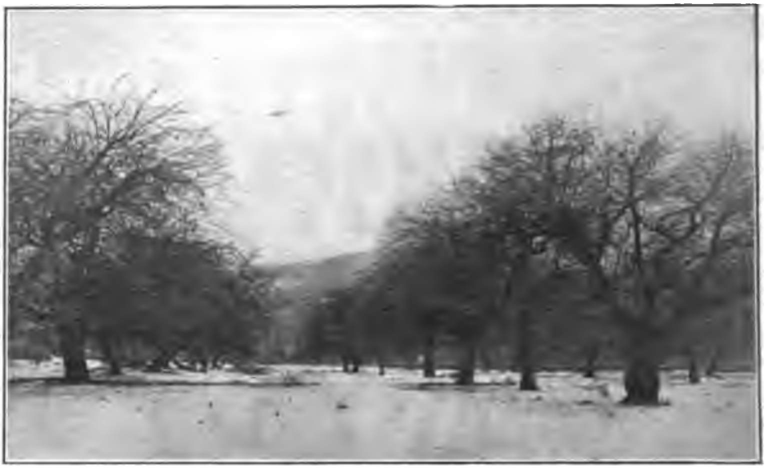

Fig. 12. One of the oldest commercial orchards in the country. Planted by the late Thomas S. Gold, West Cornwall, Conn.

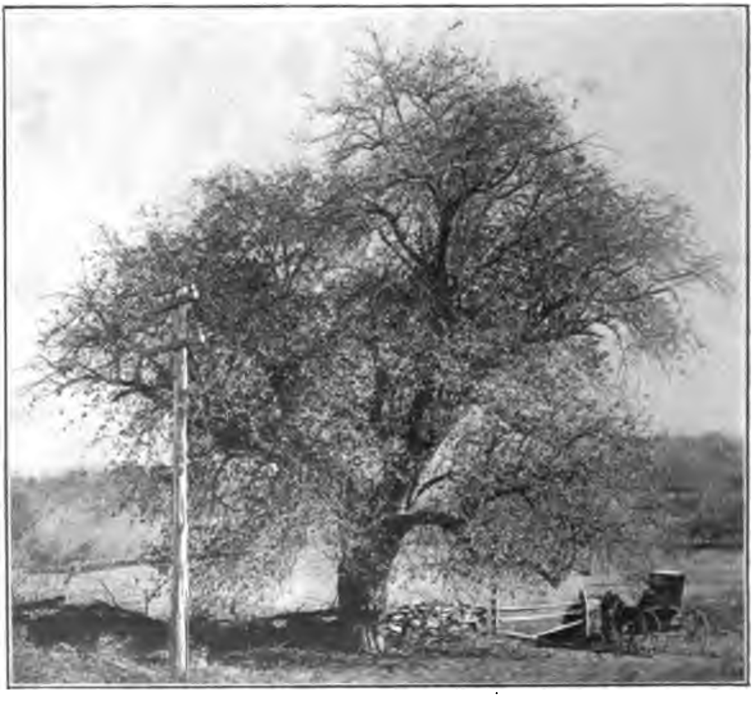

Fig. 13. A native apple tree and a pioneer of the early days. At least 150 years of age.

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INTRODUCTION.

Conditions as regards apple-growing in the various states of New England are very similar. The problem that confronts the Connecticut apple-growers confronts alike the apple-growers of the other New England states. The adoption of better methods in any particular state or locality would be of some value to the individual, but would have little effect upon the industry in general. The greatest good will come from a change of front on the part of every apple-grower in New England. The problem is, therefore, a New England problem, and this series of papers while prepared for the special purpose of aiding the Connecticut farmer and fruit-grower, is written from a New England standpoint. The recommendations suggested are not based upon the results of personally conducted experiments, but rather upon the observations and investigations of other workers and upon the results of field study, embodying the experiences of the most successful fruit-growers of the best apple sections.

I. THE APPLE INDUSTRY.

ITS RISE AND FALL.

The development of the apple industry is one of the most interesting pages in the history of New England. Space will not permit of more than a mere mention of the salient points, or those having a direct bearing upon the present condition of the industry. Commercial apple-growing is not a new industry, nor yet is it an old one. During the first half of the last century many commercial orchards of modest size were in existence, but they were composed mostly of seedling trees or "native fruit," the product of which was used largely in the manufacture of cider. The planting of real commercial orchards, however, did not occur till about 1850, when many named varieties of apples were disseminated. (See fig. 12.) About this time many of the old seedling trees were top-grafted and many young orchards started. The methods of management adopted by the commercial orchardist of this time were similar to those practiced in the old cider orchards, but owing to favorable soil and climatic conditions, rather than to superior methods, the trees thrived remarkably well.

The first set-back to the industry came with the large yields of fruit, for which, owing largely to inadequate transportation facilities, there was insufficient demand. Many manufacturing towns at that time were still far from the railways. Moreover, people had not become accustomed to using apples, for fruit was then considered an unnecessary article of diet.

Following this apparent over production of fruit, and with the opening up of large tracts of farm land in the West, came a general decline in land values, causing heavy losses both to landowners and banking houses. The apple growers became discouraged and many of them abandoned their farms and went West to take up land and to follow grain growing.

Of those who remained in the East, many cut down their orchards entirely, and others allowed them to remain with a hope that even without attention, they might produce enough to supply the family with fruit and cider. In this way the apple orchards came to be a side issue, or an adjunct to the regular farm system. (See fig. 14.)

With the development of the fruit interests, the destructive action of injurious insects and of fungus diseases became relatively more pronounced. Apple scab suddenly became a serious pest, the codling moth became more abundant, the canker worm periodically worked destruction, and finally the San Jose scale made its appearance. The fruit growers knew very little about insects or diseases and still less about methods of control. It is not surprising, in the face of such obstacles, that so little progress has been made in the growing of apples on a commercial basis.

PRESENT CONDITIONS.

Many of the orchards of the early days are still in existence. In some of them, live-stock have been allowed to pasture. In others, successive crops of hay have been harvested and in these the soil has become so depleted in fertility that the trees are dying from starvation. In still others, brush has been allowed to grow up, and it is not an uncommon occurrence to find apple trees at regular orchard distances growing in the younger forests. A few of the early planted orchards are being moderately well cared for and are producing profitable crops. Some, as suggested on the following pages, may be profitably renovated and others have passed the point of profitable production and should be grubbed out. Many of the old orchards are not well situated, the early planting having followed along the valleys. The few orchards on the higher levels invariably produce fruit of better quality and appearance.

Neglected orchards. The greatest hindrance to the apple industry in New England today is the presence of so many uncared for apple trees. One of our prominent apple buyers recently made the remark that it would be a good thing for New England if all apple trees within its borders were "wiped out." That is, he believed that in order to get rid of the worthless trees we could afford to sacrifice all the good ones. This is probably true, but we would rather keep the good ones. The advent of the San Jose scale in our New England orchards was to many fruit-growers the "last straw," but, in the opinion of the writer, it is on this little insect that we must depend to destroy these worthless trees. It is rapidly accomplishing this task, especially in Connecticut, Massachusetts and Rhode Island.

The apple will stand neglect probably better than any other crop, and a tree without any care will continue to bear fruit for

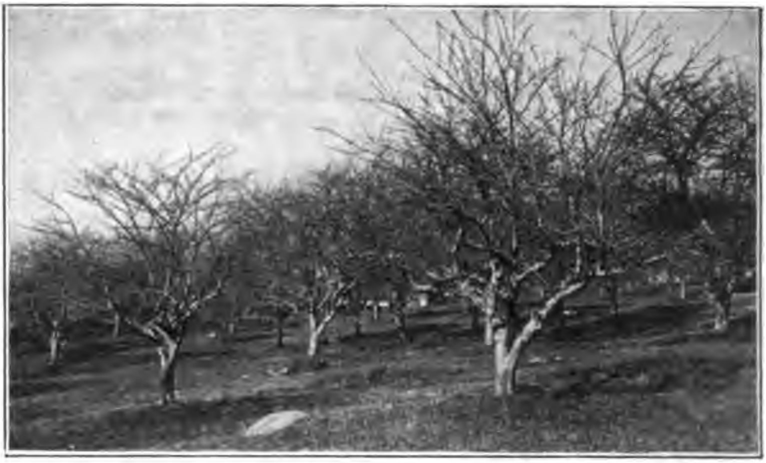

Fig. 14. A long-neglected orchard, a typical condition in New England. About 40 years old, but still capable of improvement.

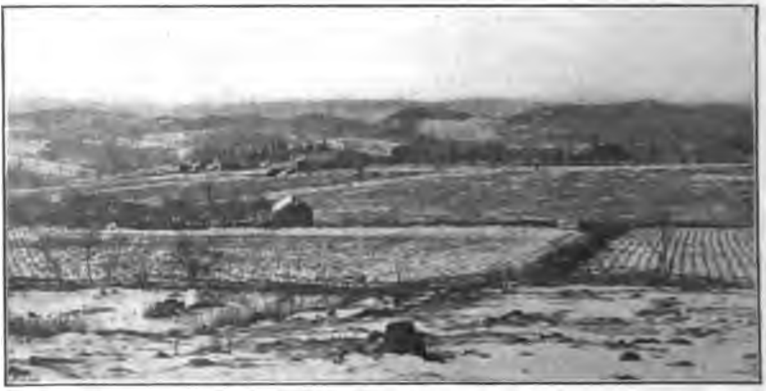

Fig. 15. View from the farm of Mr. C. L. Gold, West Cornwall, Conn. This is typical of much of the land in Connecticut, and is very suitable for orcharding.

many years. A knowledge of this fact on the part of the New England farmer has been the cause of such wholesale neglect as is in evidence everywhere, and is largely responsible for the present condition of the industry. The farmer has learned that corn and potatoes, if not fertilized and cultivated, will fail, and that cattle and hogs if not fed, will immediately show the effect of neglect, but the apple orchard he has come to know will bring fair returns, even without attention. A farmer in the neighborhood of the college was asked recently which crop on his farm paid him best. He replied that his apple crop undoubtedly was his best paying crop. Yet this man is spending his energies raising corn and hogs, and allowing a thirty acre apple orchard to be eaten up with canker worms and to die from starvation.

The effect of insects and diseases. Although the benefits of spraying have been repeatedly demonstrated, and although so much has been written on the subject, there are comparatively few sprayed orchards in New England. Even the orchards that are said to be sprayed are not thoroughly treated. The applications usually are not made at the proper time and are not repeated often enough, and moreover, the spraying machinery in common use is entirely inadequate for thorough work. The codling moth has become so abundant that seldom more than ten per cent. of the apples on an unsprayed tree escapes its ravages. The apple maggot is becoming a serious pest. The curculio is very destructive in many localities. The injury from the aphis or louse is more serious every year. The canker worm, from time to time, completely defoliates the trees. The San Jose scale is spreading rapidly and is now well established in most parts of New England. The apple scab, the rust, and sooty blotch diseases are usually present to a greater or less extent. Many other insects and fungus pests of minor importance are usually in evidence every year.

The disposal of low-grade fruit. The evaporating industry, which has become such an important industry in the apple sections of New York state, has not developed in New England. Relatively small quantities are used by the canning trade and for the manufacture of vinegar and beverages. The remainder of the low-grade fruit, except some of the very poorest, is sent to market and enters into competition with the higher grades and at the same time seriously affects the reputation of local fruit. Any industry that will utilize the fruit which is unsuitable for packing into boxes or barrels should be encouraged.

Careless and dishonest packing. The manner in which apples are prepared for market is of utmost importance and the success of the western growers is largely due to their superior methods of grading and packing. Their progress in this direction has been greatly enhanced by the careless and dishonest packing so prevalent among the eastern growers. At the present time there is no recognized system of grading among New England growers; neither is there any uniformity in the character of package. The adoption of some form of voluntary inspection and some uniform method of packing, undoubtedly would be of value in our efforts to regain the confidence of the eastern buyers and to develop a reputation in foreign markets.

Specialization and co-operation. Co-operation, also, in the hands of the western growers, has been a powerful factor in the way of securing suitable transportation facilities and rational freight rates. In the East co-operative methods in fruit growing have received very little attention, and their adoption here, under present conditions, would be of doubtful value. When apple growing becomes a specialized industry in any particular locality, the existence of a local co-operative association would be of value in the way of reducing the cost of packages, fertilizers, spraying materials and the like, and possibly may become useful from a marketing standpoint.

The lack of capital. Probably the greatest need of New England agriculture at the present time is capital. Banking houses and men of capital have lost confidence in New England soil and are eagerly investing their capital in agricultural enterprises of the West. This lack of confidence may be attributed partially to the great losses sustained by the depreciation of land values a few decades ago. But the most potent reason for the investor's change of attitude was, undoubtedly, the lack of confidence displayed by the farmers themselves. It is therefore, the first duty of the present day fruit-grower to prove to the investor that there are still great opportunities for investment in rural New England. The use of demonstration orchards to show the possibilities of apple growing and to demonstrate to the New England farmer the best methods of management, would have a far-reaching influence.

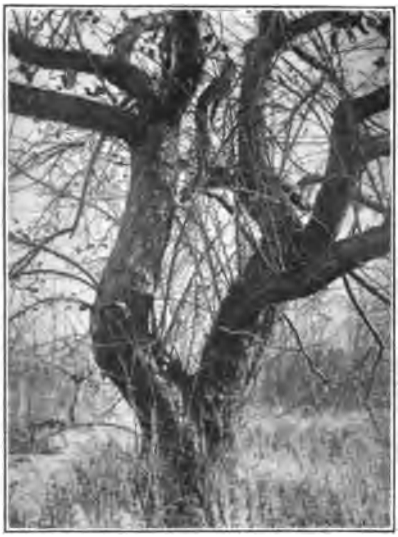

Fig. 16. Waterspouts. The first sign of neglect.

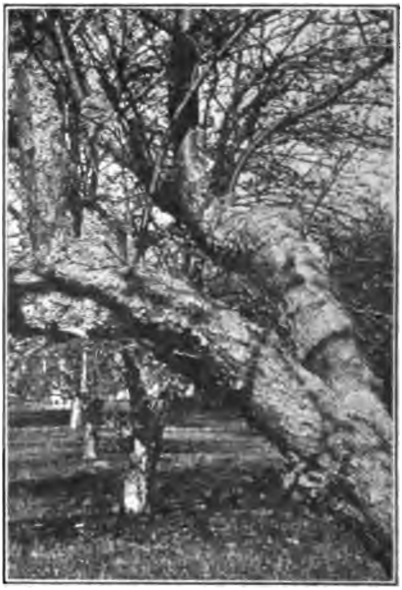

Fig. 17. Lichens or "moss." The second stage of neglect.

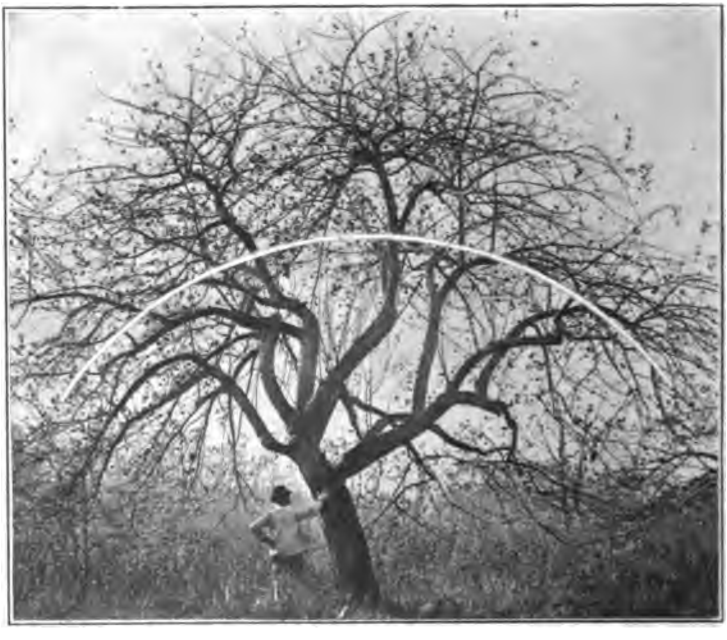

Fig. 18. A high-headed tree. If such trees are renovated they should be severely headed in, as indicated by the white line.

If the eastern grower proves that he can grow apples of a high grade and can put them on the market in proper condition, it will not take long for the investor to see the superior advantages for investment in New England.

From the foregoing remarks it is plain that in the interests of the apple industry, New England needs to cut down all her old, unprofitable and worthless apple trees; to renovate the best of her existing orchards and to start new ones on the higher elevations; to plant varieties of high quality; to follow the most approved methods of orchard management; to adopt some system of inspection to insure honest and uniform packing; to employ modern and standard packages; to devise some way of disposing of her low-grade apples, without bringing them into competition with the better fruit; to adopt more business-like methods in disposing of the marketable fruit; and to bring the industry to such a state that it will attract keen business men and men of capital, and, most important of all, capital itself.

OUTLOOK FOR APPLE GROWING IN NEW ENGLAND.

While apple growing throughout the greater part of New England has for a long time been on the decline, there now seems to be a general awakening. Many young orchards are being started and the industry is attracting some intelligent men and considerable capital. When more people engage in apple growing and when the business becomes the leading industry in any section, the enterprise will become more interesting and profitable.

FAVORABLE SOIL AND CLIMATE.

When we know that in New England apples have been grown for more than two centuries, and when we see the many successful commercial orchards of today, no further argument in favor of soil and climatic conditions is necessary. There is probably no other section of the country that possesses such a variety of soils and offers such a wide range of altitude and exposure. In view of the peculiar adaptations of many of our varieties of apples, this is an important item. The yearly rainfall is sufficient to render irrigation unnecessary, yet we seldom fail to have enough clear weather during the blossoming season to insure adequate fertilization of the blossoms. When proper attention is given to matters of site and exposure there is little danger from late spring frosts. There has been much said and written about the "worn out soils" of New England. With our better knowledge of soils we have learned that any soil that was once productive can be made so again and can be made continuously productive by proper methods of management. Some of the soils of New England are so well suited to apple growing, that for many years they have been producing large crops of handsome fruit without the addition of a pound of fertilizer. Some soils are not only producing large *undeserved* crops of apples, but are supplying a large part, if not all, of the hay used on the farm. Such soils, however, cannot retain their fertility much longer, without the addition of plant food to make up for that removed by repeated cropping.

OUR HOME MARKET.

Situated as she is, within a few hundred miles of one-third of the population of the United States, no one doubts New England's opportunity so far as markets are concerned. Moreover, this is largely an urban population, composed of non-producers from an agricultural standpoint. This section of the country with its numerous towns and cities offers exceptional opportunities to develop special trades, to supply private customers, and thus save the expense of transportation and the middleman's profits.

In the matter of transportation, the East with its network of steam and electric railways, has a great advantage over many other sections of the country. With certain perishable varieties, it is often necessary to get the fruit on the market soon after picking, and in this respect the eastern grower has a great advantage. On account of the short distance to his market he may ship by express, while the western grower must always ship by freight. Besides this saving of time there is a great saving in icing and transportation charges. It costs in the neighborhood of $300 per car to bring fruit across the continent and place it on the eastern market, while the New England grower can send his fruit to the best eastern markets at rates ranging from $30 to $65 per car. With these differences in the cost of marketing, it seems almost incredible that the western apple-grower should be a serious competitor in the markets of the East.

Demand increasing. The population of the United States has increased from twenty-three millions in 1850 to seventy-five millions in 1900, and the forthcoming census for 1910 will probably show a population of over 100 millions. If such is the case, the population will have doubled within the past thirty years. The increasing demand for fruit is due not only to the increasing population, but also, and largely so, to the increasing needs of our people for fresh fruit. The low prices of apples in the past have had a marked influence in popularizing the apple as an article of food. The demand for fresh fruit in this country has been created largely during the past fifty years. The twelfth census shows that the value of orchard products has increased from thirty-three cents per capita in 1850, to $1.11 per capita in 1900. The apple, either fresh or in the canned condition, has become a staple article of diet for all classes of people. In no other country has the apple become such a popular and widely used fruit. Undoubtedly the greatest fruit consumer in the world is the American workman and his staple fruit is the apple. That there is a great demand in the East for well grown apples is plainly shown by the eagerness with which the consumer buys the western apples at prices ranging from fifty cents to one dollar per dozen.

The following paragraph is taken from the evidence of Mr. A. McNeill, Chief of the fruit division of the Canadian Department of Agriculture, before the select standing committee on Agriculture:—

> "It is possible to show you that Canada may well hope in the very near future to monopolize practically the whole trade in export winter apples from the continent of North America. The manufacturing urban population of the United States is increasing so rapidly that it would not be a matter of surprise to see them importing apples, especially of the winter varieties, in large quantities."

Production diminishing. Statistical reports* show that during the ten-year period, 1900 to 1909, inclusive, the total production of apples in the United States was 355,441,000 barrels, or an average yearly production of slightly over 35½ millions of barrels. The average annual production for the first five years of this period (1900-1904) was 43,680,200 barrels, while that for the last five years (1905-1909) was 27,408,000 barrels, showing a decrease of 37 per cent. or over sixteen millions of barrels. The combined production of the past three seasons barely exceeds the single crop of 1896. That the apple crop of the United States has been diminishing during recent years is evident, and in view of the rapidly increasing population and the increasing popularity of the apple, there is little danger from over production within the lifetime of the present generation. If the supply should ever approach the limits of the demand, the New England grower, on account of his favorable geographical position, would have a decided advantage over the western grower, who is over 2,000 miles from his market and his exporting station.

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*American Agriculturist Yearbook 1908 and Vol. 84. No. 18 p. 400 (1909).

OPPORTUNITIES FOR EXPORTING.

Statistical records show that the annual exports of fresh apples from the United States gradually increased up to the year 1904, when they reached the maximum of 2,018,262 barrels, and valued at $5,446,473. Since that time exports have been on the decline. In 1908 they amounted to only 1,049,545 barrels, and valued at $3,660,854. This falling off in quantity, it may be seen, has been accompanied by a gradual increase in the price per barrel for all exported apples. The average price per barrel for the three-year period, 1903, 1904 and 1905, was $2.64 while that for the following three-year period, 1906, 1907 and 1908, was $3.18 or an increase of 54 cents per barrel. From these figures it seems safe to conclude that there has been an increased demand in the home market, and that foreign markets are ready to pay remunerative prices for American apples.

Great Britain annually imports apples to the extent of 2½ millions of barrels. In 1908 the United States supplied thirty-one per cent. of the total amount imported by Great Britain, while Canada supplied 59 per cent. Canada's exports to Great Britain have greatly increased during recent years as a result of the Fruit Marks act, which aims to regulate the quality of fruit. Her success in the British market is due also to a laxing of the export trade of the United States. There being no import duties on apples entering Great Britain, the United States should readily capture a large share of this trade, if at any time the supply should seriously outgrow the demand of the home market.

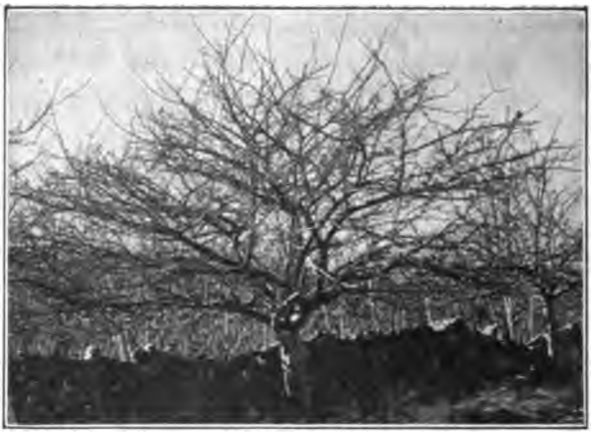

Fig. 19. A good type of tree for renovation.

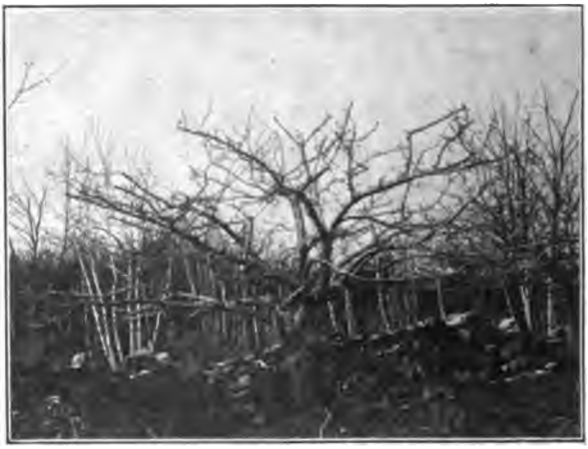

Fig. 20. The same tree as shown in fig 1 9, after pruning.

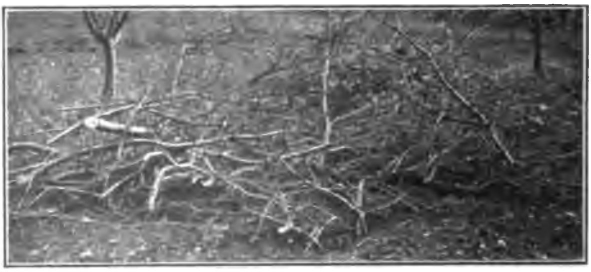

Fig. 21. The brush taken from the tree shown in fig. 19.

France and Germany are becoming attractive markets for American apples. The latter has annually imported from this country during the last three years an average of 164,529 barrels.

While the opportunities for exporting are very alluring, it is probable that there will be very little fresh fruit exported for a number of years. Food stuffs in general have advanced very rapidly during recent years, showing clearly that agricultural production has not kept pace with the increase of population. It is with the home market, then, that we shall be most concerned, and it is to this market that we should give our attention with a view of ascertaining its peculiar demands.

A PROFITABLE INVESTMENT.

There are thousands of acres of unimproved land well suited to apple growing in every state in New England. This may be purchased at prices ranging from five to forty dollars per acre, depending upon location, upon the amount of salable timber, and upon the capital required to put it into condition for orcharding. In some cases the revenue from the timber will amount to the cost of clearing and preparation. In some localities, suitable orchard land that has been cleared of stumps and stones may be purchased for forty to sixty dollars per acre. During recent years much of this cleared and uncleared land has been set out to apples. In all such cases, where reasonable judgment has been shown in reference to location and management, this land with a comparatively small outlay of capital, has increased in value three, four, and even five hundred per cent. These values are necessarily arbitrary for there is no actual selling price. Farms thus improved are seldom offered for sale.

While such increases in value mean increases in capital, they are not usually regarded as such in the money market, and it is owing to this fact that the orchard investment is slow in maturing. If the banks could be convinced that every year of a young, well-cared-for orchard meant a substantial increase in capital, there would be less trouble in securing money for orchard enterprises. It is hoped that the time will soon come when banks in agricultural sections will engage agricultural experts to estimate properly the value of orchard enterprises as security for investment.

Cost of clearing rough land. Since there seems to be a demand for information concerning the probable cost of bringing rough hill-land into suitable condition for orcharding, inquiries have been made from those who have had most experience in such work. Extracts from some of the replies are published herewith:—

"Replying to yours of the 10th, while I haven't time to go over the exact figures of clearing, planting, and developing the Pero farm to apples, a rough estimate shows a total cost of about $250 per acre to bring it up to five years of age. This sum could have been increased $50 or more per acre to the decided advantage of the orchard.

"Do not, anywhere in your bulletin give out the idea that it is an easy or cheap thing to develop a rough land apple orchard; it takes a lot of capital, as well as grit and energy, and good orchards will never be found on Easy Street."

J. H. Hale, South Glastonbury, Conn.

"We are now clearing thirty acres of land which cost $13 per acre. The most of it will cost $30 to $35 per acre to get it ready for planting. Part of it will cost about $50 per acre and another part of about six acres, where there are many stones and large stumps, and where underdraining is necessary, will cost from $125 to $200 per acre."

A. T. Henry, Wallingford, Conn.

"Your favor of the 9th inst. is at hand asking how much it costs to clear rough land and fit it for fruit growing. Of course you know as well as I do that such a question cannot be answered off hand.

"I have just started to clear 35 or 40 acres this fall. I may get 26 acres of this ready to plant in April. This is an old pasture with many stones on it, which we have to remove before starting the plow. I estimate on this field the expense will amount to about $25 to $30 per acre.

"The land we have in orchards which comprise over 300 acres has probably cost us to clear of all obstructions, including division walls, somewhere in the neighborhood of $30 to $40 per acre ready to plant. Our conditions are more favorable, I believe, than the average land conditions of the fruit-growers in Connecticut. In making an estimate of this kind, you must bear in mind that one man may be able to do this kind of work at much less cost than the other farmers, whose labor conditions are different and who are not accustomed to the work."

E. C. Lyman, Middlefield, Conn.

"Yours at hand in regard to the cost of fitting rough land for orchard planting. The degree of roughness, as to rocks, brush or timber, and also the lay of the land varies so much that a general statement might be very misleading.

"Our Durham orchard was mostly land that had been plowed at some time. Much of this land was ready for the plow. Much more of it was made ready by simply going over it with a mowing machine preceded by one or two men with brush axes to cut out large growth, and followed by the hay-rake to gather up the brush in shape for burning. Fifteen dollars per acre would probably cover the cost of fitting such land for orcharding.

"On our summit orchard, subdued about twenty years ago, we no doubt spent fifty or more dollars per acre, on quite a large tract in cutting brush and wood and removing stones and stumps."

Barnes Bros., Yalesville, Conn.

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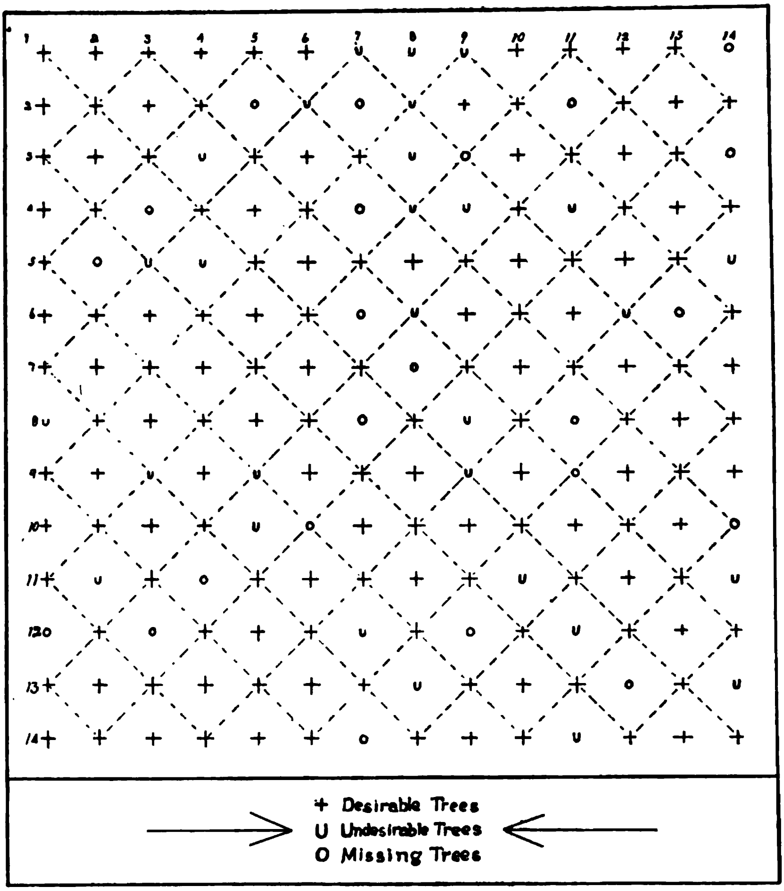

Fig. 22. Diagram showing method of thinning orchards. The dotted lines show the rows that are retained.

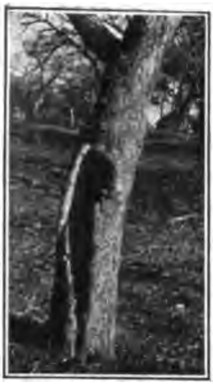

Fig 23. The result of leaving large wounds unprotected. Trees affected like this are not worth renovating.

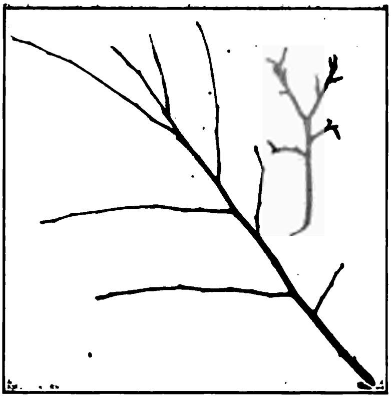

Fig. 24. Twigs from healthy and neglected trees. The spur-like twig on the right represents four years' growth on a much neglected tree. The larger twig represents only two years' growth on a normal tree.

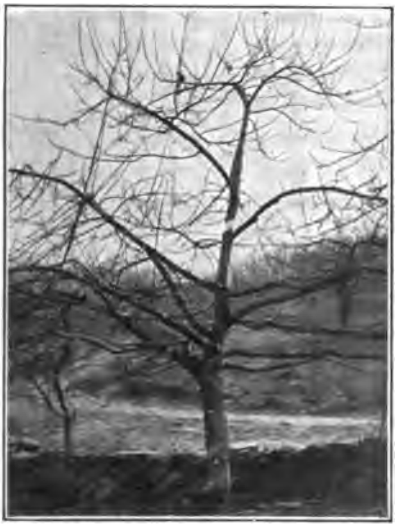

Fig. 25. This tree may be greatly improved by removing the central branch at the point indicated by the white line.

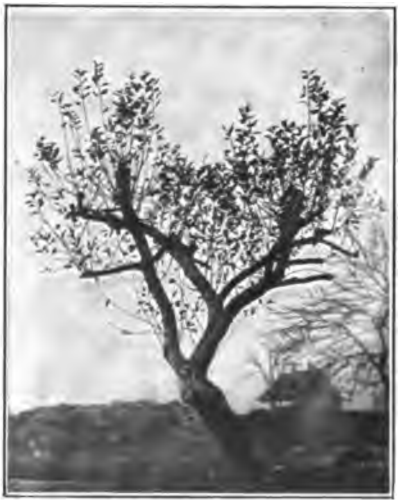

Fig 26. The first year's growth after the renovation of a much neglected tree.

II. RENOVATION OF OLD APPLE ORCHARDS.

In the campaign for the revival of the apple industry in New England, the first item to present itself is the improvement of the existing orchards. Logically it is the business of the fruit-grower to first make the best use of what he has on his farm. The interim between the planting of a young orchard and the gathering of its first fruit may profitably be spent in improving some of the best run-down apple trees. The possibility and the advantages of renovating neglected apple orchards have been so clearly demonstrated, that during recent years many old orchards have been purchased with this object in view.

The neglected orchard is the usual thing in New England and the well-cared-for orchard the exception. In every section can be found apple orchards that are not as profitable as they should be. Some, consisting mostly of small plantings around old homesteads, were started during the early part of the last century and have passed their period of usefulness. Others, of more pretentious dimensions, were planted about 1850 and, if they had been properly cared for, they would be producing profitable crops at the present time. There are also many others, that vary in age from twenty to forty years, and that, under rational management, should be producing maximum profits.

WILL IT PAY?

In the matter of orchard renovation the first question to present itself is, "Will it pay?" In order to answer this question intelligently several points should be considered:—

1. *The attitude of the man.* The owner of the orchard should first decide whether in the future he will give the trees proper treatment with regard to tillage, fertilization, pruning, thinning, and spraying. If the orchard is under new management, it is more likely to get satisfactory treatment than if under the management

of the man who previously neglected it. Not every man can make a success of fruit growing. Some men have not the taste and would do well to leave this phase of agriculture to those who are more interested.

2. *Age and vigor.* It will seldom pay to undertake the renovation of apple trees that are over thirty or forty years of age, or those that show serious lack of vigor. Trees that have been repeatedly defoliated by canker worms, usually lack vigor and respond to treatment very slowly. Or if the disease known as apple canker is abundant, manifested by many dead limbs and decayed spots on the trunk and main branches, it would probably be more profitable to relegate the trees to the wood pile.

3. *The position of the head and the general shape of the tree.* In earlier plantings, high-headed nursery stock was commonly used and the close planting of the trees has tended to make them higher. On account of the difficulty of spraying high-headed trees and the added expense in harvesting the fruit from such trees, it is not advisable to undertake the improvement of an orchard composed largely of very high-headed trees. Providing, however, that the trees are not too old, good results may be expected from the renovation of moderately high-headed and long-armed trees by severely "heading in."

4. *The stand of trees.* It will not pay to cultivate and fertilize an orchard if there are many vacancies. On the other hand, in some orchards the trees are so closely planted that it becomes necessary to remove a number of them, and in such cases, a vacant space here and there may prove to be an advantage. It is not advisable to attempt to grow other crops in the vacant spaces, nor is it satisfactory to start young trees in an old orchard. When the trees to be renovated are along the roadside or a line fence, the vacancy factor may be ignored. In orchards where less than 60 per cent. of the trees remain, the best practice would probably be to pull them all out and start a young orchard.

5. *Character of soil.* The apple thrives well on a great variety of soils, varying from sandy loam to heavy clay, providing it is well drained and otherwise well cared for. The chances for success are much better, however, where the orchard to be renovated is located on sandy or gravelly loam, or even clay loam, than where located on either light sand or heavy clay.

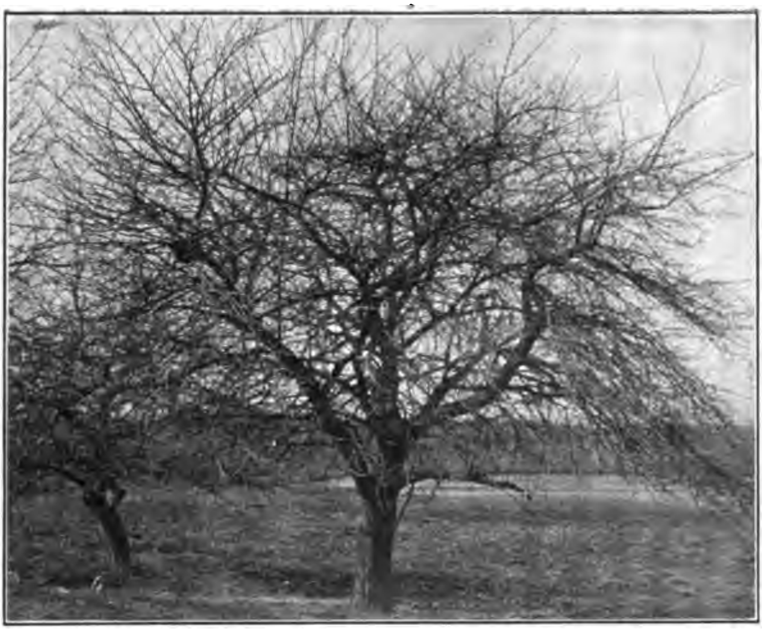

Fig. 27. A high-headed tree badly in need of repair.

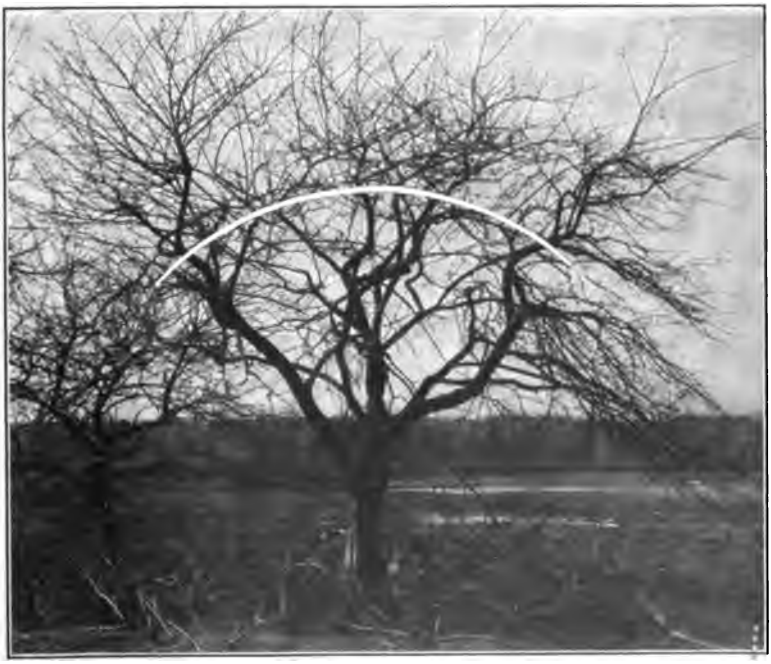

Fig 28. The same tree as shown above, after pruning. This tree should have the top removed as shown by the white line.

6. *Exposure.* Many of the older orchards are on "bottom lands" along the valleys, where they are more likely to be affected by late spring frosts, as also are those located on the southern slopes. Others are found on sites exposed to the strong west winds, where much loss is often occasioned by the fruit being blown off. Again orchards are often found on cold, springy hillsides where the soil does not warm up readily in the spring. Such a condition, however, may be much improved by either surface ditching or underdraining. The renovation of such orchards, will prove less satisfactory than of those located on a high and protected northern or eastern well-drained slope.

7. *Presence of scale.* The control of the San Jose scale in old apple orchards is a difficult problem, and requires unusual perseverance and determination on the part of the grower. Unless one has had experience in controlling the scale in apple orchards, it probably would be unwise to undertake the renovation of a scale-infested orchard. By severely cutting back the branches, by scraping off all rough bark, and by repeated sprayings one is likely to succeed, but it is certainly very expensive and discouraging work, at the best.

8. *Varieties.* The question of varieties, while by no means the least important factor in successful renovation, is considered last, for the reason that this is a fault that may often be corrected by top-grafting. If, however, an orchard is made up of a large percentage of undesirable varieties, it might better be used to increase the size of the wood pile, for it is a long, tedious, and expensive job to graft over large apple trees.

In summing up, then, we may say that success in renovating neglected apple orchards depends upon the age, shape, stand, and vigor of the trees; upon the location of the orchard with regard to soil, altitude, and exposure; and, most of all, upon the attitude of the man.

HOW TO PROCEED.

As no two orchards are just alike, each will require special treatment, and, for this reason, it is impossible to lay down any hard and fast rules to be followed in all cases of orchard renovation. While it is true that in some orchards particular attention should be given to one or more phases of the renovating process, the best results will come from giving the very best treatment all along the line. After going to the expense of cultivation and fertilization it would be a short-sighted policy to allow the apples to be eaten up by worms or to be disfigured by disease.

Orchard renovation is necessarily a rejuvenating process and the treatment, with some modification, is the same as that required for a young orchard. The trees, after being stimulated into activity, are maintained in a healthy condition by regular methods of tilling, feeding, pruning, and spraying.

Having decided that the orchard is worth renovating, the trees should be given a general awakening. The severity of treatment will depend largely upon the condition of the trees. The index to the health of a tree is the amount of annual growth, which with a normal tree is from six to eighteen inches. The spur-like growth, usually observed on neglected trees denotes a lack of vigor. When the annual growth at the ends of the twigs is small, or not more than one or two inches, the treatment should be more severe in every way, than when the yearly growth exceeds this amount. (See fig. 24.)

The various orchard operations are discussed here from the standpoint of the neglected orchard only. They will be discussed more fully in a later bulletin.

PRUNING.

If the orchard is composed of suitable varieties, and the trees are not to be top-grafted, the first operation will be that of pruning. In many orchards the trees are too closely planted. That they have not commenced to crowd is due more often to a lack of vigor than to proper spacing. The renovated orchard, under favorable conditions. will soon require more room. The larger growing varieties like Baldwin, Rhode Island Greening, Northern Spy, Roxbury Russett and many others, will eventually require forty feet between the trees. With the small growing sorts, like Transparent, Oldenburg, Wealthy, McIntosh and others, twenty to thirty feet may be sufficient.

Thinning the orchard. The first step, then, is to determine if the trees are properly spaced. If they are found to be too closely planted and if some of them must be removed, it is well to follow some regular order so as to retain the conformity of the orchard.

Where trees are planted in squares, as is commonly the case in New England, every alternate tree in the row may be removed. If the first tree of the first row is retained, the first tree of the second row should be removed. This is done by taking out every second row diagonally. This method, it will be seen, leaves the rows cornerwise of the orchard. If the squares between the trees were originally 25x25 feet, they would now be 35.3x35.3 feet. If originally they were 30x30 feet they would now be 42.4x42.4 feet. So that by removing half the trees it does not follow, as is commonly supposed, that the trees will be twice as far apart as before.

In order that the diagonal rows to be removed may contain the largest possible number of vacancies and inferior trees, it is well to make a diagram of the orchard, locating on it all desirable trees by a particular sign, all weak trees and trees of undesirable varieties by another sign, and all vacancies by another. The result would be something like fig. 22..

As to whether one should start by removing the first diagonal row, or the second, may readily be determined by referring to the diagram. The even rows, as shown in the accompanying figure, include 19 vacancies and 18 weak or undesirable trees, while the odd rows include only 4 vacancies and 11 undesirable trees. In this particular case, then, it would be advisable to remove the even, diagonal rows, which include 37 out of a total of 52 vacancies and undesirable trees. The rows that remain include four vacancies, and the question may arise as to whether the trees adjacent to these vacancies should be removed. In some cases it may be advisable to leave such trees, but it must be remembered that each one so situated is likely to crowd one side of three other trees. An investigation by the Cornell Experiment Station shows that, within certain limits, the more trees per acre, the less the yield. Their results are based on the records of hundreds of orchards and cover a period of four years. A brief summary follows*:—

Not over 30x30 feet	186 bu. per acre
31x31 to 35x35 feet	222 bu. per acre
36x36 to 40x40 feet	229 bu. per acre

Shaping and thinning the trees. Most trees are too high and may be greatly improved by cutting back the upper branches. A tree that is 30 feet or over in height often may be shortened by 10 or 15 feet, and one between 25 and 30 feet often may be cut back to about 15 or 20 feet. The horizontal branches, as well as the upright ones, may be cut back to advantage, especially with trees seriously lacking in vitality, and also those infested with scale. In heading back the upright branches, the cut is usually made just above a side branch that points outward. This tends to make the tree more spreading in habit. With trees that are naturally spreading and where a more upright growth is desired, the cutting may be done just beyond an upright side branch. If this method is followed with all horizontal branches, a much stronger structure will be the result. (See figs. 18, 19 and 20.)

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*Cornell Exp. Sta. Bul. 226, p. 301, 1905.

The severity of heading-in, will depend largely upon the vigor of the tree. Nothing will start a tree into renewed vigor like severe pruning during the dormant season. The cutting-back, therefore, should be more severe with weakened trees. With moderately vigorous trees, there is danger of producing a rank growth in the form of water-sprouts. If it is desirable to severely head back such trees, it is better to do it gradually, a little each year, and withhold all nitrogenous fertilizers. A still better plan would be to remove about half of the required amount of brush during the winter, and the remainder during the growing season. The effect of summer pruning upon the vigor of the tree is just the opposite to that of winter pruning and will counteract the stimulating effect of the latter. With most of the neglected orchards, however, the vitality is so low that most of the pruning may be done, without fear of injury, during a single dormant season.

The severity of cutting-back will also depend upon the presence of scale. The work of spraying is greatly simplified and the chances for success in controlling the scale are greatly enhanced by extreme methods of pruning.

After the trees have been sufficiently headed in, all dead and diseased branches should be removed, and also, such other branches as are necessary to produce a condition favorable to the free circulation of air and the admission of sun-light. While it is possible to over-do the pruning process, especially with the best of neglected orchards, the average man is more likely to err in the other direction.

Taking care of wounds. The universal rule in pruning is that all cuts should be closely and smoothly made and that the larger

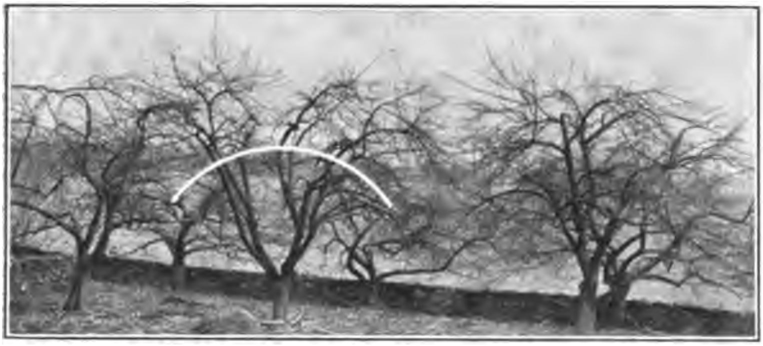


Fig. 29. Long-armed trees. The result of close planting. Half the trees should be removed and the remainder severely headed in.

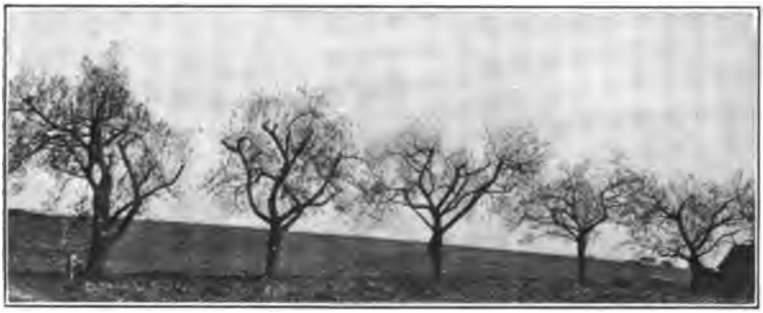


Fig. 30. The first year's growth after the renovation of some old high-headed trees. The proper treatment for trees of this kind.

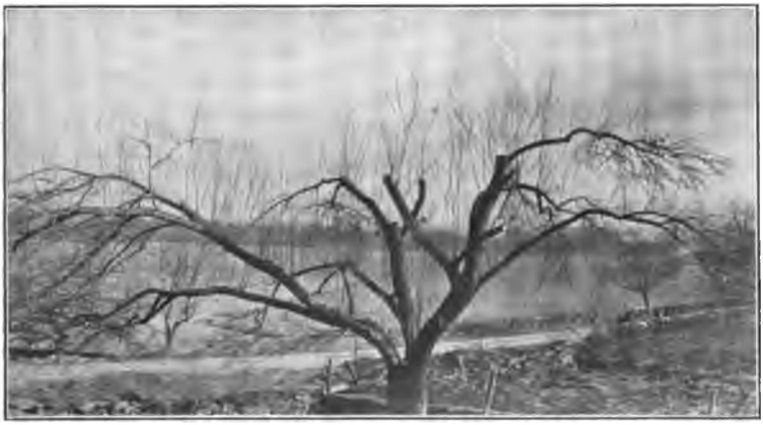


Fig. 31. When cutting back moderately vigorous trees it is sometimes advisable to leave some of the lower branches intact and thus reduce the severity of the shock.

wounds should be painted over to keep out wood-decaying fungi. The smaller wounds heal over quickly and will take care of themselves. Before applying the paint, the wood should be allowed to dry. Common lead paint, made up of white lead and boiled linseed oil, is very suitable for this purpose. If desired, a small amount of coloring matter, such as lamp-black, may be mixed with the paint so that the spots will be less conspicuous.

SOIL TREATMENT.

Undoubtedly, the chief cause for the present unprofitable condition of many of our New England apple orchards, is starvation. Repeated crops of apples, and sometimes hay, have been taken from the orchard without the application of a pound of fertilizer to make up for this continuous drain on the plant-food of the soil. The physical condition of the soil, also, has become seriously affected, and the feeding roots of the trees are likely to be found very near the surface in their search for air.

While under some special conditions an orchard may be renovated without breaking up the sod, the average orchard can be most effectively revived by thorough cultivation. As with pruning, the severity of the treatment is dependent largely upon the condition of the trees. In the most extreme cases of neglect; severe pruning, thorough cultivation, and liberal feeding, would be the proper treatment, but the severity of each operation should be modified in accordance with the vitality of the trees. In some cases, it may be advisable to do the pruning the first year and leave the cultivating and fertilizing till the second year, or to do the pruning and cultivating the first year and leave the fertilizing till the second year. The important point of the whole matter is to avoid seriously disturbing the equilibrium of the trees.

Cultivation. In most cases, it will be advisable to cultivate the orchard the first season. As early in the spring as practicable, the sod should be plowed under and then cut up by the use of a disc or a cut-a-way harrow. Under favorable conditions the sod may be subdued with the use of the cut-a-way harrow without plowing. For subsequent cultivations, the spring-toothed harrow will be found most useful. Cultivation should be continued until about the first of July, when the seed for some kind of a cover-crop should be sowed. The plowing should not be too deep at first, for, as previously noted, the roots in a sod orchard are very near the surface. Providing good general treatment is given, however, the breaking up of some of the roots will not seriously injure the trees. On the contrary, it will tend to offset the possible stimulating effect of excessive pruning and feeding during the first season. The harrowing is best done soon after a rain, so as to keep a loose soil mulch on the surface of the ground and thus prevent excessive evaporation. The soil, of course, should not be worked while wet, for this will injure its physical condition.

Cover-crops. A cover-crop in an orchard serves several useful purposes, the most important of which are: (1) to improve the condition of the soil, by adding plant-food and vegetable matter; (2) to prevent the loss of available plant-food during late fall and early spring; (3) to utilize the surplus plant-food and moisture in the fall and thus check the growth of the trees so that they will go into the winter in a well-ripened condition; and (4) to make a soil cover that will protect the roots during winter and that will prevent soil washing. From the standpoint of orchard renovation the third point is probably of greatest importance, for the stimulating effect of pruning and cultivation is likely to prolong the growth in the fall.

Some cover-crops, like the clovers and the vetches, serve all the functions enumerated above, while those like cow-peas, soybeans, turnips, buckwheat and the like, die in the fall and offer very little protection during the winter. The clovers and the vetches are probably most suitable for New England conditions. These are nitrogen gatherers and leave the soil richer in nitrogen than before they were grown. Crimson clover is a rapid grower, and, where it may be depended upon to stand the winter, is preferred. Hairy or winter vetch, sown broadcast about the first week of July at the rate of one bushel to the acre will give excellent results. The price of seed, about $7 per bushel, is its chief objection. Where it is difficult to get a "catch" of other crops, rye may always be depended upon.

As a rule these winter cover-crops are plowed under in the spring, but, if the trees are making satisfactory growth, they occasionally may be allowed to remain during the summer. If not

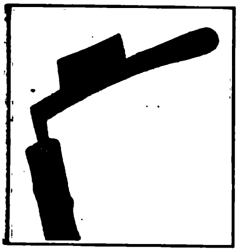


Fig. 32.

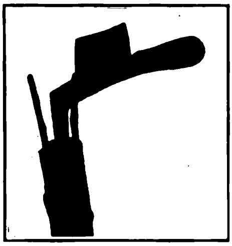


Fig. 33.

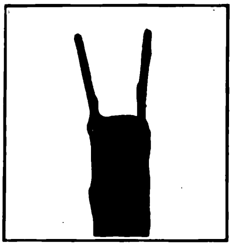


Fig. 34.

The various stages in the process of making a top graft. Fig. 32 shows the stock with the split held open for the reception of the scions. Fig. 33 shows the scions in position and fig. 34 the same after the wax has been applied.

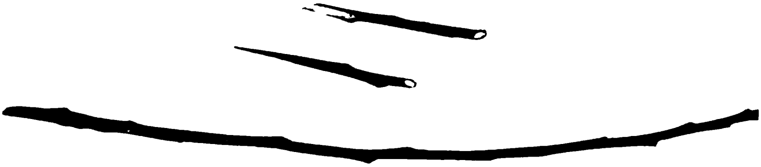
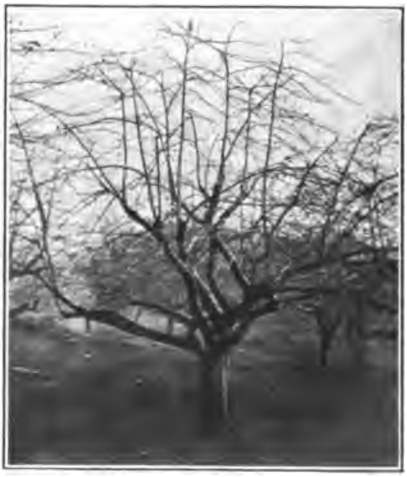


Fig. 35. A good piece of scion wood and two scions ready for use.



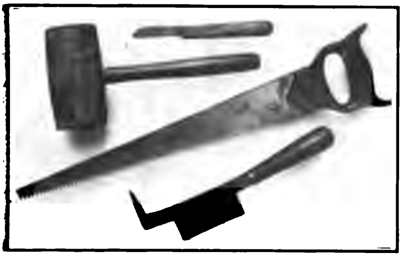


Fig. 36. Tools used in top grafting.

Fig 37. A top-grafted apple tree. Some of these grafts should be removed.

ploughed under in the spring, they should be mowed regularly and left on the ground to form a mulch.

Fertilization. It is well to remember that nitrogenous fertilizers, like sodium nitrate, ammonium sulphate, dried blood, etc., produce a vigorous growth and should be used only where rapid wood growth is desired. When liberally used in orchard renovation there is danger of producing too much wood, resulting in a soft, succulent growth that will not ripen up well in the fall, and is likely to be injured by winter freezing. As a rule, it is not safe to apply nitrogenous fertilizers during the first season of the renovating process, except in some form, like raw ground-bone, that will become available very slowly. Stable manure is not suitable for the reason that it contains a large proportion of nitrogenous material, and applications carrying the required amount of mineral elements would furnish an excess of nitrogen. If it should be necessary to use stable manure during the first season of renovation, it should not be applied in large quantities and its use should be accompanied by a quick-growing cover-crop to utilize the surplus nitrogen in the fall.

While it is seldom necessary or expedient to apply nitrogenous fertilizers, it is usually advisable to give a liberal feeding of potash and phosphoric acid. Hard-wood ashes, when they may be obtained, and when their composition is known to be up to standard, are very suitable for orchard use. They usually contain about 5 per cent. of potash, 30 to 40 per cent. of lime, and a small amount of phosphoric acid. Potash may be obtained in the form of muriate or sulphate of potash. Where immediate results are required, a readily available form of phosphoric acid, such as acid phosphate, will give best results. For subsequent use, however, one of the slower dissolving forms, such as raw ground-bone, may be more economically applied.

For the first year in the renovation of an apple orchard the following formula is suggested:

	Per Acre
Muriate or sulphate of potash	200 lbs.
Acid phosphate	300 "
Raw ground-bone	400 "

When the phosphoric acid in the raw bone becomes available, the amount of acid phosphate may be reduced. It may be reduced by one-half, the second season, and omitted entirely, the third and subsequent years. In view of the beneficial effect of lime on most soils, 400 pounds of basic slag, which contains a large proportion of lime, may be substituted occasionally for the raw ground-bone. Free lime, or fertilizers containing lime, like basic slag and wood-ashes, should not be used with acid phosphate, for the reason that lime renders phosphoric acid insoluble. Good results in orchard renovation have followed the use of 200 pounds of muriate of potash and 400 pounds of basic slag per acre. The quantities of the various materials required for single full-grown trees may be determined by dividing the given amounts by thirty.

Commercial fertilizers are best applied after plowing, when they should be thoroughly worked into the soil by disking. It is important to get them into the soil just as growth is commencing in the spring.

The hill-side orchard. Occasionally, an orchard is found on comparatively heavy soil and so situated that if kept under cultivation the soil would be likely to "wash." There are very few orchards, however, in which a thorough system of tilling and cover-cropping cannot be employed with safety. The heavy rains usually occur in the fall or early spring, when the soil would be protected with a cover-crop. Washing may often be prevented by terracing the orchard. This is done by leaving a narrow strip of sod along the rows, or between the rows, and the rest of the ground cultivated.

While better results usually may be obtained from the tilled orchard, it is also possible to produce satisfactory results from some systems of sod treatment, and those orchards that cannot be conveniently cultivated, may be made highly remunerative by liberal feeding and mulching. In such cases, the feeding should be such as will produce a strong growth of herbage, which when cut will form an effective mulch and thus prevent the loss of moisture. The liberal application of stable manure, supplemented with muriate of potash and acid phosphate would be a good start toward bringing a neglected orchard into a thrifty condition under sod treatment.

CHANGING THE VARIETIES.

Most neglected orchards contain some trees of undesirable varieties that would be worth top-grafting. It is well known that many varieties of apples are self sterile and, to secure complete fertilization, every orchard should have a few scattered trees, at least, of some variety that blooms at the same time. It is well to keep this in mind when changing the varieties in an orchard. Where solid blocks of one variety are found in an orchard, it would be well to top-graft a few trees to supply the necessary pollen for the trees in the main planting.

Cleft-grafting. There are several methods of grafting that may be employed on old apple trees. The one most commonly employed, and undoubtedly the one most satisfactory for New England conditions, is known as cleft-grafting. The operation is extremely simple and may be performed by any man of ordinary intelligence. The limb to be grafted is sawed off squarely, leaving a smooth stub, which is split down the center for about two inches with a grafting-chisel or knife. The split is held open with a wedge, which is usually a part of the grafting-knife. The scions, should contain three buds and should be trimmed at the base in the form of a long, slender wedge. The sloping cut should commence just above the lower bud and the finished wedge should be slightly thinner on the inner side, or the side opposite the bud. Two of such scions are placed in each stub with their thicker margins outward. The scions should be pressed firmly into place, and, most important of all, the inner bark of the scion should come in contact with the inner bark of the stub or stock. The professional grafter usually slopes the scions outward, so that the cambium layers will come in contact where they cross. When the scions are properly set, the wedge is removed. The pressure from the stock should hold the scions firmly in position. (See figs. 32 to 38, inclusive.)

Wax should now be carefully applied to all cut surfaces for the purpose of excluding air and moisture. For convenience, waxed tape is often used. It also serves the purpose of holding the scions more firmly in position and prevents the splitting of the stock. The waxed tape is usually made by winding strips of thin cotton into a ball and dropping it into hot wax. The wax readily penetrates the ball. A suitable wax may be made by melting together, 1 pound of tallow, 2 pounds of beeswax, and 4 pounds of resin. The melted wax is poured into cold water to harden. When cool enough to handle, it should be pulled like taffy until it becomes light colored. By oiling the hands the wax may be prevented from sticking.

Gathering scions. It is believed that better results follow the practice of selecting scions from bearing trees, but this has not been experimentally demonstrated. In any variety, however, there may be found superior individuals from which it would be well to select scions for grafting. Well matured wood of the previous season's growth makes the best scions. Terminal shoots from bearing trees that have made a growth of one to two feet are well suited to the purpose. Water sprouts or "suckers" are not satisfactory for the reason that the wood is usually spongy and the buds usually too far apart.

Scion-wood is usually gathered in the fall, soon after the leaves drop, and stored in a cool place. It may be covered with moist sand in a cool corner of the cellar or buried in soil on the north side of a building. The important point is to keep it at a uniformly low temperature.

Time to graft. Top-grafting is always done during the growing season. The work may be commenced just before the buds swell in the spring and continue, if necessary, for four or five weeks. If it is necessary to prolong the season, it is better to continue late than to commence earlier than the time mentioned.

Selecting the stubs. With trees that are extremely weak the whole top may be removed and grafted in one season. In most cases, however, it is better to remove only those branches required for grafting, or those that will form the new top. The remainder may be removed the following season. The chief objection to this practice is the probability of injuring the young grafts, when the brush is eventually removed.

Care should be exercised in the distribution of the stubs so as to form a well shaped tree. It should be remembered that the young grafts always grow upward and, for this reason, one stub should not be located beneath another. Stubs one or two inches in diameter are most suitable for grafting. Those larger than this seldom heal over completely.

After treatment. If the grafts should make a very rank growth the first season, they should be pinched back to prevent injury from strong winds. If both grafts grow, one should be sawed off about midsummer. In the following spring, the grafts, if not treated during the previous summer, will need to be cut back about half their length to induce a spreading habit. The pruning of a graft

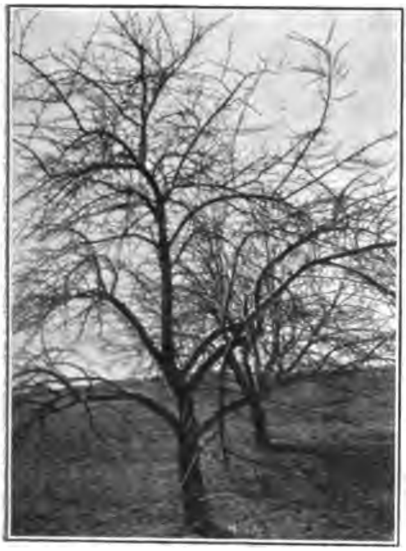


Fig 38. A top-grafted tree where two scions have been allowed to grow on each stock. The disastrous result is shown on the right.

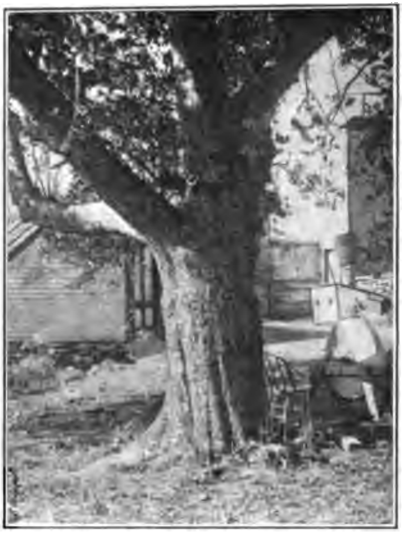


Fig. 39. Trees like this with a constricted trunk, were probably top-grafted about 1850.

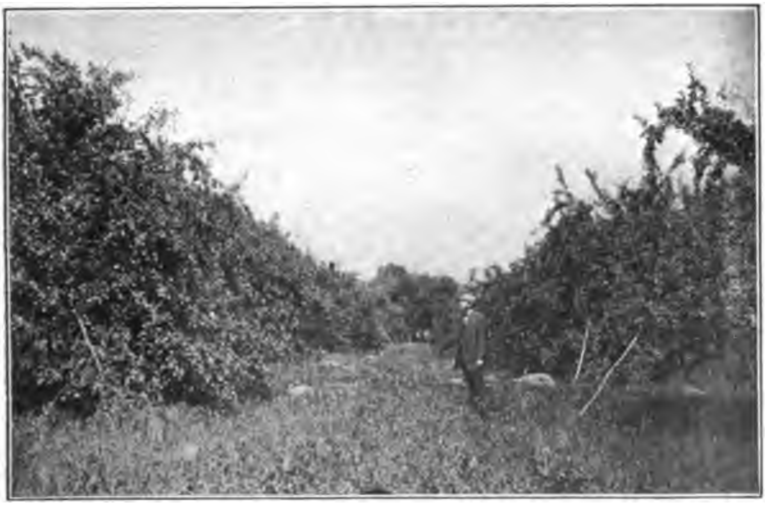


Fig. 40. A successfully renovated orchard on the farm of Conyers Manor, Greenwich, Conn. This orchard, four years after renovation, produced an average of nine barrels to the tree.

will require some care and should not differ much from the pruning of a young tree. The limbs of the old variety, left from the previous season, may be removed in March or April. In order to get them out without injuring any of the grafts, it may be necessary to cut them up into several pieces. If there are more grafts than are necessary to produce a good top, as is likely to be the case, they may be removed at the time of removing the brush.

SPRAYING.

Where the *San Jose scale* is present, the work of spraying will probably be the most difficult task of the man who undertakes to revive an old orchard. Such orchards will probably need two applications the first year, one in the fall and the other in the spring. Spraying for scale, however, may be done successfully any time while the trees are dormant, providing the temperature is above the freezing point. The lime-sulphur wash, either prepared or home-made may be used for this purpose. But, on account of its spreading action and its adaptability to the use of a fine nozzle, miscible oil will probably give better results. All rough bark should be scraped off before spraying is commenced, and great care exercised in covering the whole surface of the tree with the spray. Thoroughness is the important part of the treatment. For further information on this subject see bulletins 54 and 56 of this station and 165 of the Connecticut Experiment Station, New Haven, Conn.

The summer spraying will consist of three or four applications of combined Bordeaux mixture and arsenate of lead. The first application should be made just as the buds are about to burst, the second as soon as possible after the blossoms fall, and the others at intervals of about 10 to 15 days. The most important one is the one just after the falling of the blossoms, for this is especially intended for the codling moth, curculio, and several leaf-eating insects. If there is a good crop of fruit, and sooty-blotch threatens, an application of ammoniacal solution of copper carbonate about August 15th., will be found useful. In the neglected orchard, on account of its being so thoroughly infested with various kinds of insects and diseases, the spraying will be less effectual the first season, and for this reason also, more careful and persistent work will be necessary. For spraying formulas, directions, and equipment, see Bulletin 56 of this station.

AN EXAMPLE OF SUCCESSFUL RENOVATION.

Since visiting Conyers Manor, a large estate near Greenwich, Connecticut, the writer holds more hopeful views on the subject of orchard renovation. On this farm, the manager, Mr. George Drew, has successfully revived several orchards of various ages and of various degrees of decreptitude. Before treatment was commenced, all of the orchards were seriously infested with scale and the trees were making practically no growth. At the present time deep indentations in the bark may be seen where the insect once thrived, but no longer exists. While many trees over fifty years of age were successfully rejuvenated, Mr. Drew secured best results with trees thirty to forty years of age. In one orchard, a picture of which is herewith presented, he secured an average of nine barrels to the tree. (See fig. 40.)

While Mr. Drew has had at his disposal unlimited means for the carrying on of this important work, he has adopted simple methods, such as any farmer may employ. His success is due more to the thoroughness of the treatment than to the methods employed. The most striking feature of his renovating work is the severity in cutting-back, or "dehorning," as he calls it. The height of the trees in some cases has been reduced by twenty to twenty-five feet. The dehorning process was more severe with trees that were especially high-headed and those that were particularly weak from the effect of scale or other troubles.

On the farm under discussion clean cultivation with the use of cover-crops is the rule. At the time of the writer's visit, November 20, 1909, a fine stand of crimson clover was found in all orchards and, as the trees are now making a very vigorous growth, Mr. Drew intends to allow it to remain next season instead of plowing it under as usual. He will mow it, of course, and allow it to remain on the ground.

Mr. Drew's experience with fertilizers is embodied in the following letter under date of December 6, 1909:—

> "Conditions vary so much in different places that it is rather hard to generalize on what fertilizer treatment a neglected orchard should receive. In our own case where the trees had long been neglected, as shown by small amount of annual growth, irregular shaped and poor quality of fruit, together with other marked signs of debility, we were obliged to take vigorous action. In the first place we broke up the soil with a Clark's orchard harrow before applying the chemicals.

"The first year we applied the chemicals broad-cast over the entire area, between the trees, at the rate of 100 lbs. nitrate of soda, 250 lbs. H. G. sulp. of potash and 500 lbs. of basic slag. The change the first year was very marked in the vigor of the trees and the appearances of the fruit. In conjunction with the other treatments the orchard seemed to have taken on a new lease of life. The second season we omitted the nitrate of soda, using crimson clover as a cover-crop, which was worked into the soil the following spring. Basic slag and potash were applied in the same quantities. The third season we followed the same treatment using, only 100 lbs. of sulphate of potash and 250 lbs. basic slag, per acre.

"We now have our orchards seeded down to clover and depend on the latter amount of potash and basic slag as an annual dressing per acre. The trees are thrifty, unusually productive and I can see no reason why they should not produce abundantly for years to come."

In controlling the scale Mr. Drew uses both miscible oil and lime-sulphur wash. He believes that either if thoroughly applied will control the pest. When asked how he succeeded in getting men to do such thorough work, he replied that he followed them around very closely and insisted on having every portion of the tree covered with the spray.

Those who own run-down orchards and who contemplate their renovation, would do well to visit Conyers Manor.

STORRS
Agricultural Experiment Station
STORRS, CONN.

BULLETIN No. 62, FEBRUARY, 1910.

APPLE GROWING IN NEW ENGLAND.

III—Planting the Apple Orchard.

By C. D. JARVIS.

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No. 61. Apple Growing in New England.
No. 62. Apple Growing in New England.

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Address all requests to the Director of Storrs Agricultural Experiment Station, Storrs, Conn.

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III. PLANTING THE APPLE ORCHARD.

The constantly increasing value of food stuffs tends to change agricultural consumers to agricultural producers, or in other words, to direct population from the city to the country. This movement is now plainly discernible and is bound to become more pronounced in the future. As a result, there has arisen a new type of farmer who seems to be specially attracted by the occupation of fruit growing, and whose first impulse is to write to the various sources for information on the subject. New England agriculture is in a state of re-adjustment. Many stock raisers, dairymen, and general farmers of the East are finding their respective lines of business less profitable than formerly, and in looking around for a more remunerative line of endeavor, have decided upon fruit growing. There are therefore, many people starting in the fruit business who are unfamiliar with the first principles of apple growing. This bulletin, which is the second of the series in the interest of the apple industry, has been prepared with this in mind. At the same time, it is hoped that some of the suggestions may be of use to the experienced apple-grower.

SELECTING THE LAND.

In buying land the fruit-grower should remember that he is buying its fertility, or its power to produce crops. He is buying not only crude earth, but all the forces above the soil as well as in it, that are needed to transform the crude elements into fruit. He should consider, therefore: first, the atmospheric conditions (elevation, exposure, etc.); and second, the conditions pertaining to the soil (its supply of available plant food, its physical condition, its depth, its drainage facilities and its general adaptability to apple growing). These matters should be considered, also, in respect to the adaptability of any particular field to the purpose intended.

In Connecticut, the fruit-grower or prospective fruit-grower may choose between the improved land that may often be purchased for from $40 to $60 per acre, and the rough unimproved land at from $5 to $40 per acre. The higher priced land is often cheaper in the end, for the work of clearing in most cases is an expensive and uncertain undertaking. The rough "sprout" land, that is being used by some of the prominent fruit-growers of the state, has proved to be not only very difficult to subdue, but very costly to manage for a number of years. (See fig. 41.) The extra expense in clearing and in subsequent tillage of such land may often greatly exceed the original saving in buying the lower-priced land. Inquiry from those who have had most experience, reveals the fact that it is impossible to set any definite figure as to the probable cost of preparing rough land for fruit growing.*

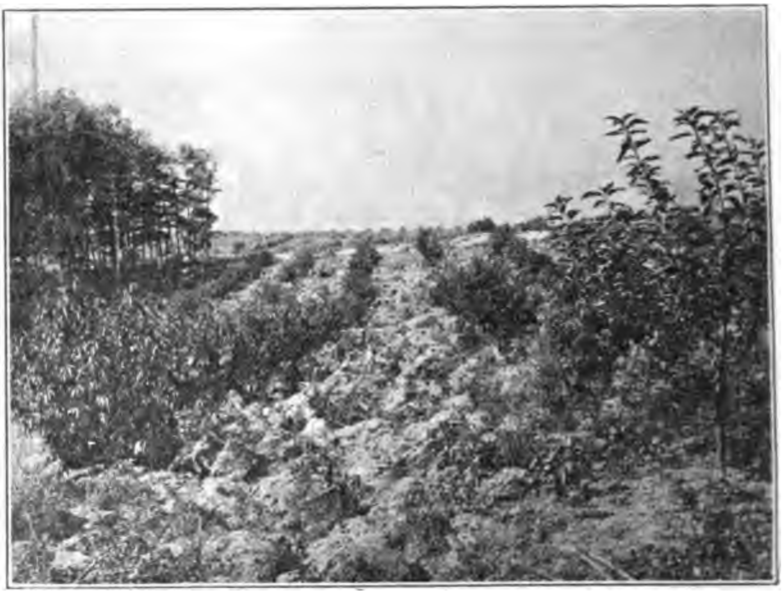

Fig. 41. Orcharding on rough land. This picture was taken two years after planting. The growth on the left gives some idea of the previous condition of the land. Peach trees are used as fillers. (Hale & Piero farm, South Glastonbury, Conn.)

Elevation and exposure. The best site for an orchard is one that is somewhat elevated above adjoining lands. Such a site not only gives better soil drainage, but what is more important, better air drainage. It is well known that the colder air being heavier settles to the lower levels. A difference of several degrees due to this fact, is often observed in different sections of an orchard. This is, therefore, an important consideration in sections where hard winter freezes and late spring frosts are common. Moreover, on account of the clearer atmosphere and the relatively longer periods of sunshine, fruit that has been grown on the higher elevations is likely to be of better quality and appearance. A southern slope offers relatively more sunlight, but there is a common notion that with such an exposure an orchard is more susceptible to injury from late spring frosts. While it is true that the buds of trees on a southern slope will start earlier than those on a northern slope, there is little danger from this source if proper attention is given to elevation. The most experienced apple-growers favor an eastern or northeastern slope, but in most sections of New England the apple may be depended upon to do well on any slope. A western slope, however, is objectionable, unless the trees are protected from the strong prevailing winds. The use of a wind break in such cases will prove valuable in the way of checking the evaporation from the soil and trees and of preventing the breaking of the branches and the falling of the fruit. A forest on the windward side of an orchard is often worth more as a wind break than for any other purpose.

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*See Storrs Bulletin 61, p. 73, 1910.

Choice of soil. The ideal soil for an apple orchard is probably a heavy sandy or gravelly loam with a gravelly sub-soil. The character of the sub-soil is probably of greater importance than the surface soil. A gravelly sub-soil insures better drainage and this is of the first importance, for an apple tree must have air around its roots as well as among its branches. The apple will thrive well on the lighter soils, but such soils require more careful treatment to maintain the necessary supply of humus and plant food. Some careful growers prefer a sandy loam for apples, for they believe that it produces fruit of better color. While some soils are more suitable than others, almost any soil in the state, if properly treated, will produce apples successfully.

SELECTING THE NURSERY STOCK.

Where to buy trees. It is usually advisable to patronize local nurserymen. They generally handle the varieties that are best adapted to local conditions. But, if the local dealers have not the required varieties in stock, or if their trees are not of the desired shape, it would be better to order from a distant nursery, rather than to accept undesirable stock. By dealing with a local nurseryman, the buyer can visit the nursery and personally select his stock, and at the same time reduce the risk of introducing injurious insects and diseases that are not common to the neighborhood. Again, home nurserymen are more likely to supply the kind of stock ordered, for if they persistently misrepresent their goods, they cannot long continue in business. The agent for a distant firm, on the other hand, can constantly change his field of operation. A list of the nursery firms of Connecticut may be found in the last report of the State Entomologist. These reports may be obtained by appplying to the Connecticut Experiment Station, New Haven, Conn.

Kind of trees to buy. Most growers plant two-year-old trees and, other things being equal, they are probably most desirable. It is often difficult, however, to get such trees of the desired shape. The two-year-old tree has its top formed in the crowded nursery row and therefore does not assume the proper shape. During recent years the difficulty of getting properly shaped trees, has been greatly lessened, for the nurserymen are now heading their trees much

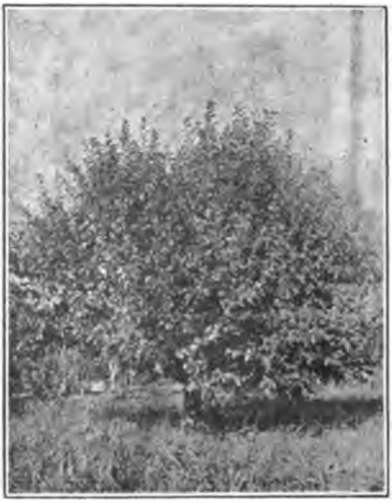

Fig. 42. A well-shaped 12-year-old tree.

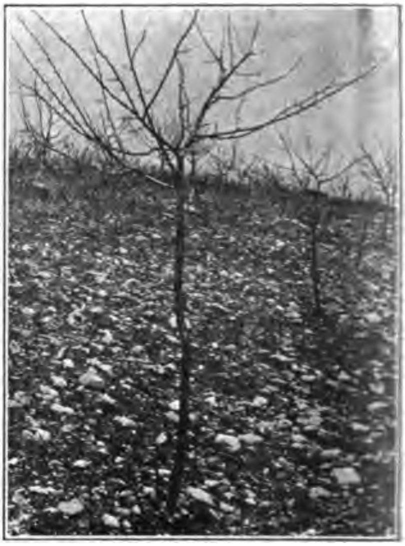

Fig. 43. Poorly-shaped young trees. The heads have been started too high.

lower. The low-headed tree is now generally preferred. For most varieties the head should be formed about two feet above the ground, but with those varieties, like Rhode Island Greening and Tolman that are naturally spreading, the head may be started higher, and with varieties like the Yellow Transparent, that are naturally upright growers, the head may be started much lower. (See figs. 42, 43 and 44.)

If two-year-old trees of the proper shape cannot be obtained it would be better to buy yearlings, which are mere whips, and plant them in a nursery row for a year, giving them more room than they previously occupied. In this way the grower may shape his trees to suit himself. This method is especially applicable to the man who must clear his land before planting, for the reason that there would be no loss of time. With the man who has his ground ready to plant, on the other hand, it would mean a loss of one year. Some recommend the buying of yearling trees and placing them back in the nursery row for two or more years, or the buying of two-year-old trees and putting them back in the nursery row for one or more years before setting them in the orchard Such a practice affords an opportunity of weeding out the weak and undesirable trees before they reach their permanent location, and permits of the full use of the orchard land for other purposes for one or more years without effecting the development of the trees. It is also claimed that such a practice induces early bearing. The chief objection to the practice is the added expense in handling such large trees when they are finally transferred to their permanent location.

Nurserymen frequently offer two grades of trees, known as first-class and second-class. Those of the latter grade are usually ill-shaped or undersized trees and may be obtained at a lower rate. Sometimes fairly good results follow the use of second-class stock, but as a rule, the saving is not sufficient to warrant the taking of any chances on such trees. The largest trees of a certain age are not necessarily the best for planting. They are more difficult to handle and, as a rule, are more seriously affected by transplanting. Southern-grown nursery stock is usually larger than that grown in the North. This is not a serious objection, but the ex-

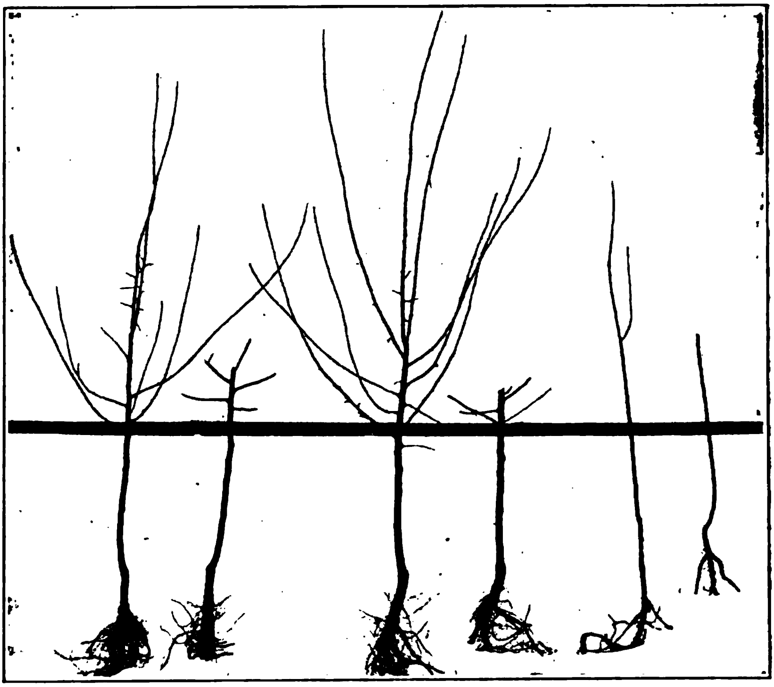

Fig. 44. Pruned and unpruned nursery trees. The pair on the left are Connecticut-grown trees; the center pair are southern-grown trees; and the pair on the right are yearling trees.

tremely large trees receive such a shock at the time of transplanting that they frequently make a very slow and scanty growth the first season. (See frontispiece.)

Care should be exercised in selecting stock free from disease and injurious insects. It is a common thing to find trees affected with crown-gall, woolly aphis, and San Jose scale. It is important also to make sure that the trees have been well cared for after digging. Most nursery stock is dug in the fall and either heeled in over winter, or stored in cool sheds, cellars, or cold storage houses. Trees with bark that has become blackened, dry and shriveled, or soft and loose, are likely to have been injured in storage and should not be accepted.

Home grown trees. The apple is usually propagated by grafting or budding seedlings that have been produced from cider-mill apple seeds. The common practice is to sow the seed in the fall without separating it from the pomace. Sometimes the seed is washed out of the pomace and stored in moist sand in a cool place till spring when it is sown in drills. If the seedlings make a good growth, they may be budded the first season in August or September, but in this part of the country the growth is likely to be too slow for this purpose. The most satisfactory method is to dig the seedlings in the fall and heel them in till about December, when they may be taken inside for grafting. Each individual may be grafted at the crown, or the root may be cut up into three or four pieces and each one grafted. The grafts are then packed snugly in sand or moss and stored in a cool cellar till spring, when they are planted out in the nursery row.

The average commercial apple-grower will find it more satisfactory to secure his stock from a reliable nurseryman. In special cases, where the orchardist has had experience in propagating fruit trees, or when large plantations are projected and when the land is not ready for planting, there is some justification for growing nursery stock at home. The advantage of propagating apple trees at home is not so much the saving in money, although that is an advantage, as in the certainty of getting them true to name.

Double working. There are many varieties of apples that, owing to some defect in the tree, thrive much better and produce better shaped trees when top-worked on some hardy and strong-growing stock. Such varieties as Northern Spy, Tolman and Maiden Blush are often chosen as stocks for this purpose. The trees to be used for stocks are set out in the orchard and reworked either the first or second season. The entire top is usually cut off and the scions of the desired variety adjusted by the process of cleft-grafting. Some growers prefer to wait till the third or fourth year and either bud or graft the main branches. The following varieties are believed to be benefited by working on hardier and stronger-growing stocks: Esopus Spitzenburg, Hubbardston, Jonathan, Red Canada, Tompkins King, Williams, and Wagener.

Dwarf apple trees. A dwarf apple tree is one that has been grafted upon a slow-growing, imported stock. Dwarf stocks are of two kinds, Paradise and Doucin. Trees grafted on the former seldom attain a height of more than ten or twelve feet while those grafted on the latter grow much larger. The chief advantage in growing dwarf apple trees is the ease and thoroughness with which

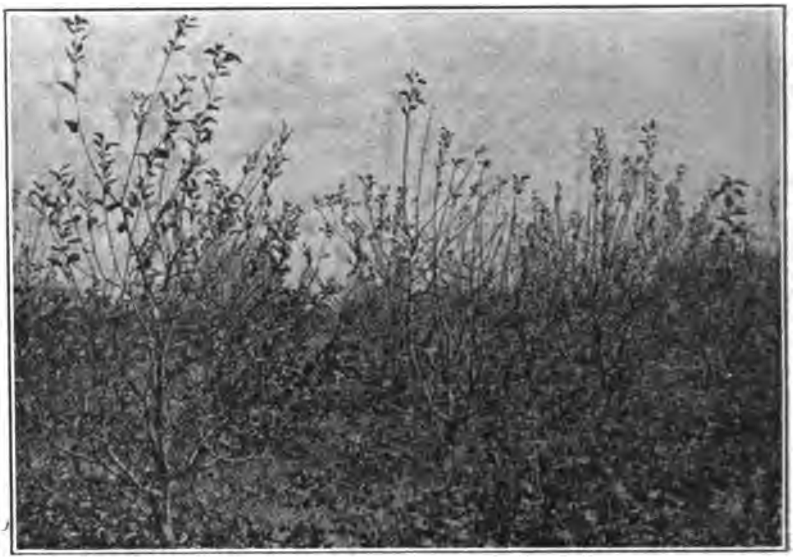

Fig. 45. A dwarf apple orchard about ten years old. These trees have not yet borne a profitable crop.

the various orchard operations may be performed. It is also claimed that they come into bearing earlier, but such is not always the case. For the amateur who wishes to grow fancy fruit, regardless of the cost, the dwarf tree will best suit his purpose. For the commercial grower, on the other hand, the dwarf tree has proved to be entirely unsatisfactory. It is generally conceded by those who have had most experience with such matters, that the cost of producing apples with dwarf trees is considerably greater than where standard trees are employed. (See fig. 45.)

SELECTING THE VARIETIES.

There is probably no problem pertaining to the starting of young orchards of greater importance than the selection of varieties, and concerning which there is such a scarcity of authentic information. When we consider the inadequate and much exaggerated catalogue descriptions, it is not surprising that serious mistakes have been made in the selection of varieties. It is hoped that the time will soon come when the nurserymen will find it profitable to publish without exaggeration the good and bad points of the varieties listed, and to give more information concerning the adaptability of these varieties to some particular set of conditions. The question is necessarily one of adaptation. Varieties should be considered from the standpoint of adaptability: (1) to the soil and climatic conditions; (2) to the kind of treatment they are likely to receive; and (3) to the purpose intended, whether for home use or market and whether for local, distant or export market.

1. While there are many striking examples of variety adaptation to soil and climate, our knowledge of the subject is extremely meager. It is doubtful if the question is of such vital importance as was formerly believed, for varieties are now being grown successfully in localities that were thought to be prohibitive. It is true, nevertheless, that some varieties are so well suited to a particular soil and climate that they produce profitable crops under ordinary, or even indifferent methods of management. It is also true that other varieties that would generally fail under such management, may be made equally profitable by special methods of soil treatment and by giving more attention to the matter of altitude. The varieties that succeed well in the North are likely to be more at home at high altitudes. As a general rule, the color and flavor of the variety is intensified by growing it nearer its northern limit, and the growing of a variety at a higher altitude produces a similar result.

2. For a man who is not prepared to study the peculiar needs of a variety, the old reliable sorts like Baldwin and Rhode Island Greening, are most suitable. Such vraieties have been grown successfully for many years and seem to be especially well adapted to conditions in New England. Adaptability in this case is due probably as much to the peculiar methods of management as to the conditions of soil and climate.

3. The man who selects varieties for home use will be governed by a different set of rules from the man who is going into the business on a commercial basis. The one may select family favorites, without regard to their productiveness and shipping qualities, but the man who must make a living from his apples and who is competing with thousands of other growers, must select varieties that will produce large quantities of fruit of the kind that the market demands. If he expects to supply distant markets, the commercial grower must select varieties that will stand the rough treatment that goes with packing and shipping.

Number of varieties to select. The man who makes apple-growing his specialty will do well to select a succession of varieties to lengthen out the season. The grower who has apples maturing from July to November will be able to hold his pickers throughout the season and to supply his customers with fresh fruit at any season of the year. The man who is growing both peaches and apples, of course, will not want any summer varieties, for they will mature when he is busy with his peach crop. There is danger, however, in having too many varieties. It is always an advantage to be able to make up large shipments of a single variety. The man who is growing a limited number of varieties has a better opportunity of learning their peculiar requirements and may become more proficient in their management. Two or three varieties each, of summer, fall, and winter sorts should be sufficient. The following list gives a succession of those that are well adapted to New England conditions: Red Astrachen, Williams, Oldenberg (Duchess), McIntosh, Hubbardston, Rhode Island Greening, Baldwin. There are many other reliable varieties that may be substituted for those mentioned.

Summer apples. Apple-growers of New Jersey, Delaware and Maryland are supplying the eastern markets with large quantities of summer apples and they find the business very profitable. There seems to be no reason why the growers in the neighborhood of the New England markets should not secure a large share of this trade. The early summer varieties usually come into bearing earlier than the winter sorts and small crops are often obtained within five or six years after planting. The early maturing summer varieties are often used as fillers in orchards of larger growing and later maturing sorts. Among the best summer varieties for commercial growing may be mentioned, Keswick, Oldenburg, Red Astrachan, Williams, and Yellow Transparent. The Olderburg is later in season than the others and is sometimes classed as a fall variety.

Fall apples. The application of cold storage methods to the apple business has had a wide influence in popularizing fall varieties for commercial purposes. Some of our best quality apples are among the fall varieties and with the use of cold storage they may be kept in good condition till the Christmas holiday season. Many of them, like the summer varieties, come into bearing much earlier than winter sorts and for this reason are largely used as fillers in permanent plantings. Wealthy is probably the most satisfactory for this purpose. Among the varieties for commercial planting may be mentioned: Alexander, Bismarck, Blenheim, Chenango, Cranberry Pippin, Dudley, Fall Pippin, Fameuse, Gravenstein, Late Strawberry, Longfield, Maiden Blush, McIntosh, Twenty Ounce and Wealthy. Of these the Bismack, Fall Pippin, Gravenstein, McIntosh and Wealthy, when given proper treatment, are known to succeed well in Connecticut.

Winter apples. As a rule, two-thirds of any commercial orchard should be composed of winter varieties. They are usually harvested at one picking and, for this reason, the expense of harvesting is less than that of fall and summer varieties that frequently require several pickings to get the fruit at its best. There is less risk with winter varieties, for if the price is not satisfactory in the fall, they may be held safely until conditions improve. In case of over-production, also, the winter sorts can be exported to better advantage than the summer and fall varieties. The list of profitable winter sorts is so large that it is difficult to suggest a limited number. It is rather remarkable, however, that there are so few varieties that have attained any reputation in the commercial field.

The Baldwin and Rhode Island Greening are pre-eminently the leading varieties of New England. Besides these, the following winter varieties have been profitably grown to a greater or less extent and are recommended for planting in Connecticut: Hubbardston, Jonathan, Northern Spy, Red Canada, Roxbury, Stark, Sutton, Tompkins King, Wagener, and Westfield. There are many more varieties, such as Delicious, Ontario, and Winter Banana, for example, that have done well in other sections, but that must be given a wider trial before they can be recommended for general planting. The Tompkins King is not recommended unless top-worked on a hardier stock like the Baldwin or the Northern Spy. Many other varieties including Hubbardston, Jonathan, Red Canada, and Wagener, make comparatively weak growers and may be improved by top working on stronger growing stocks. The Wagener is an early-bearing, short-lived variety and makes an excellent filler to be used among longer-lived trees. The Northern Spy is especially recommended for planting at altitudes above one thousand feet.

Varieties of high quality. The question is frequently asked if it would not be advisable to grow more high-quality varieties instead of the more productive sorts. As a rule, the varieties of high quality are less productive, require more careful handling, and bring higher prices. The western growers cannot afford to raise anything but the most productive sorts and are supplying the eastern markets with apples that are not of the best quality. In order to improve the reputation of New England apples, therefore, it would seem advisable for the eastern growers to produce a larger proportion of high-quality fruit, and to some extent sacrifice quantity for quality. Some varieties of high quality suited to commercial planting are: Williams, McIntosh, Gravenstein, Fall Pippin, Fameuse, Tompkins King, Rhode Island Greening, Sutton, Esopus Spitzenburg, Wagener, Grimes, Jonathan and Northern Spy. The Baldwin, when grown under the most favorable conditions, may be included in this class. Any of these varieties are suited to home use, and at least enough to supply the family should be found in every orchard.

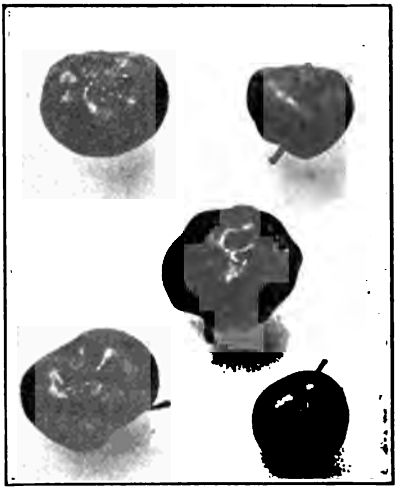

Fig. 46. Gnarly apples—the result of inadequate pollination.

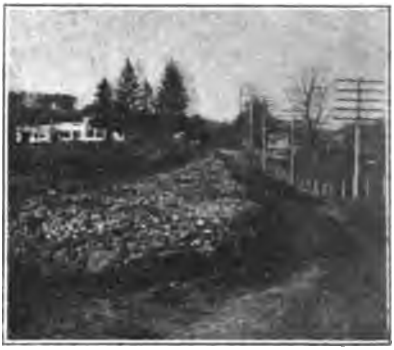

Fig. 47. The stone from the orchard land has been used to improve a road. This pile of stone is about 20 feet wide and four to five feet deep.

Block planting. For convenience in harvesting it seems desirable to plant trees of the same varieties near together, but, on account of many varieties being self-sterile, it is not advisable to plant more than two or three rows of a single variety in one block. A self-sterile variety is one whose pollen will not properly fertilize the flowers of the same variety. Trees whose blossoms have not been properly fertilized usually fail to set fruit, but sometimes produce more or less fruit of a gnarly and worthless character. (See fig. 46.) The pollen from a self-sterile variety may be depended upon to fertilize the blossoms of any other variety that blooms at the same time. It is difficult to say which varieties are self-sterile and which are self-fertile, for the subject has not yet been sufficiently investigated. There seems to be a difference of opinion among those who have made a study of the subject, for some claim that certain varieties are self-sterile while others believe them to be self-fertile. It is probable that a variety may be self-sterile in one locality and self-fertile in another. The varieties that are generally recorded as self-sterile and that should not be planted alone are: Red Astrachen, Yellow Belleflower, Chenango, Gravenstein, Maiden Blush, Tompkins King, Primate, Rambo, Gano, Tolman, Esopus Spitzenburg, York Imperial, Winesap, Roxbury Russet, Golden Russet and Northern Spy. The varieties that are generally believed to be self-fertile are: Oldenburg, Yellow Transparent, Fallawater, Grimes, Jonathan, Rome Beauty, Rhode Island Greening, and Baldwin. These conclusions are the result of limited observations, and until more reliable information is available, the best practice is to avoid large blocks of any single variety and to plant varieties of the same blooming period in adjoining rows.

PREPARING THE LAND.

Much of the orchard planting in Connecticut is being done on rough brush land. Some growers have planted the trees after simply cutting and burning the brush, leaving the plowing and harrowing till later in the season. There is a strong objection to this method for the subjugating process is rendered more difficult by the presence of the trees, and even with the utmost care, some trees are sure to be injured. A more satisfactory method is to fit the land the first season and set out the trees the following spring. There would be no loss of time by this method, if the trees are purchased the first season and planted in nursery rows for a year. On account of the trees being limited to a small area in this way, they may receive the very best treatment and may be properly trained.

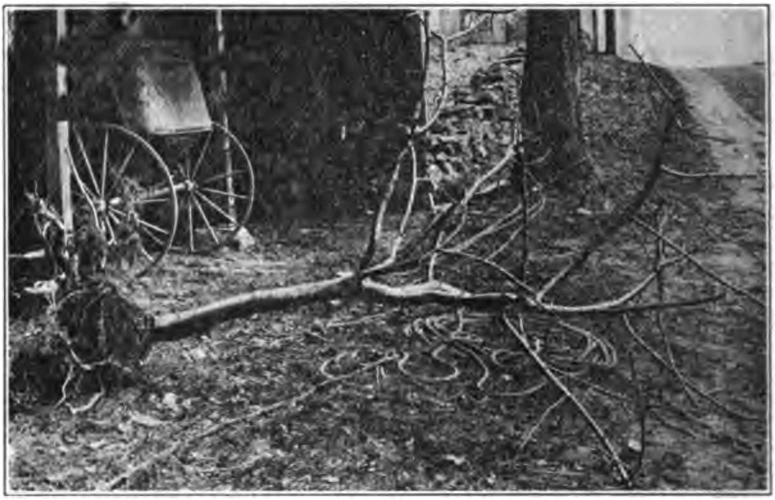

Fig. 48. A 12-year-old tree ready to be transplanted. This tree was planted as a filler and ten years after being set in the orchard was successfully removed to a new position. It bore a good crop of fruit two years after transplanting.

Any one who is contemplating the clearing of rough land is advised to consult some of those who have had experience in such work. Briefly, the operation consists in cutting and burning the brush, removing stumps and stones, and plowing and harrowing. In some cases where the growth is small, the brush may be cut with a mowing machine or with brush scythes, and gathered up with a horse-rake. A modern stump-puller may be used to advantage, but the work is more frequently done with dynamite. When they do not interfere with the locating of the trees, the larger stumps are sometimes left to decay, but in order to facilitate cultivation, it is usually best to remove them at the time of clearing. The plowing will be a rough job at best, but two or three times over with the cut-a-way harrow will compensate for all irregularities.

The work should be commenced as early in the season as possible so as to have the ground ready for a cover-crop by the first of August. Where there are many large weeds and other herbage, buckwheat is probably the best kind of a cover-crop for the first season. If the ground is in good condition of tilth, it may be advisable to use clover, which is more valuable from the standpoint of fertility, but lacks the characteristic "smothering" action of buckwheat. Clover has the advantage also in that it covers the ground and prevents washing during the winter and spring. In the following spring the cover-crop should be either ploughed under or worked into the soil with a cut-a-way harrow. The work should be started early enough to permit at least two harrowings before planting time.

Old pasture land, and even land that has been under cultivation, should have the same treatment with regard to tillage and cover-cropping. Much of the run down land of the state is sadly in need of humus, or decaying vegetable matter, and the turning under of a cover-crop will go a long way toward restoring fertility and making the land productive. Any land, and more particularly pasture land, should be very deeply ploughed or subsoiled before being used for orcharding. Subsoiling is almost out of the question on stony land, but the necessity for it on such land is not so great.

Underdraining. The work of preparing land for orcharding becomes very expensive where underdraining is necessary. In view of the abundance of suitable orchard land, it would seem unwise to select for the purpose land that requires to be underdrained to any great extent. Occasionally, however, a small area in a large tract will be found to be springy, and to avoid open spaces in the orchard, should be underdrained. The apple, like most fruits, will not thrive on wet soil. It is not necessary to go into the philosophy of underdraining at this time. It is enough to say that for apple orchards the drains need to be about fifty feet apart, and should be comparatively deep to prevent their being clogged by the roots of the trees.

The grass-mulch method. It is not the intention here to discuss the various advantages and disadvantages of the grass-mulch method of orcharding. Undoubtedly there are many instances where this method is practiced to advantage and many more where it is the only feasible system. On rugged hillsides where there would be danger of washing, the necessity for retaining a sod cover is undisputed. In view of the difficulty of conducting the spraying and harvesting operations on steep hillsides, it is very doubtful whether such land should ever be chosen for orchard purposes. It is probable that a combination of the mulch and tillage systems will be found most useful for New England conditions, but this matter will be discussed more fully in a later paper. The important thing to remember at this time is that, regardless of what system the grower intends to follow, the preparation of the land is essentially the same. On steep hillsides, however, where cultivation is not feasible, the trees may be set in the sod and small circles cultivated around them with a grubbing hoe. Even in such cases it would be better to break up the sod over the whole area and immediately reseed the land to clover.

LAYING OUT THE ORCHARD.

Distance between the trees. The proper distance apart for planting depends altogether upon the ultimate size of the tree, which will vary with the variety, the soil, the location, and the kind of treatment. With good treatment, full grown trees of the smaller growing varieties, like Wagener, Wealthy and Yellow Transparent, for example, may not require more than twenty to twenty-five feet, while those of the larger growing sorts like Baldwin, Rhode Island Greening or Roxbury Russet, may require from thirty-five to forty feet. When located on the heavier soils, especially at the base of a hill, trees usually grow much larger, and sometimes attain a spread of fifty feet. As pointed out in Bulletin 61, the investigations of the Cornell Experiment Station based upon the behavior of hundreds of orchards, reveal the fact that within certain limits, the wider the spacing the greater the yield. It would seem advisable either to space the trees the maximum width or decidedly closer. The reason for this is that in a very closely planted orchard, half of the trees may be removed when they begin to crowd, leaving the remainder about the right distance apart, while in an orchard where the trees are only moderately close, the removal of every alternate tree would leave the remaining trees too far apart. (See figs. 49 and 50.) The question of thinning out orchards is discussed in Bulletin 61.

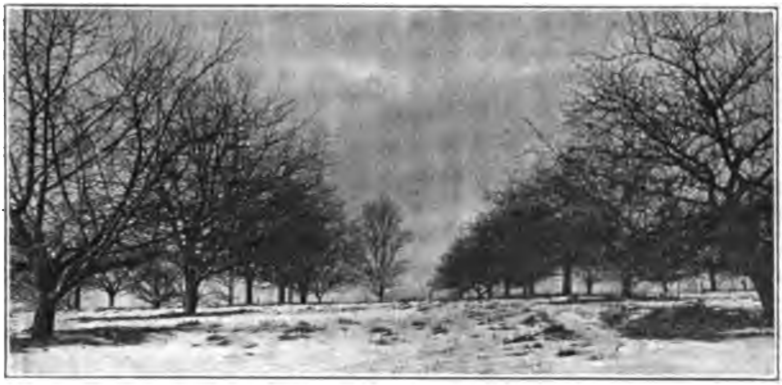

Fig. 49. Well-shaped apple trees in an orchard planted 40 feet apart each way. (Farm of C. L. Gold, West Cornwall, Conn.)

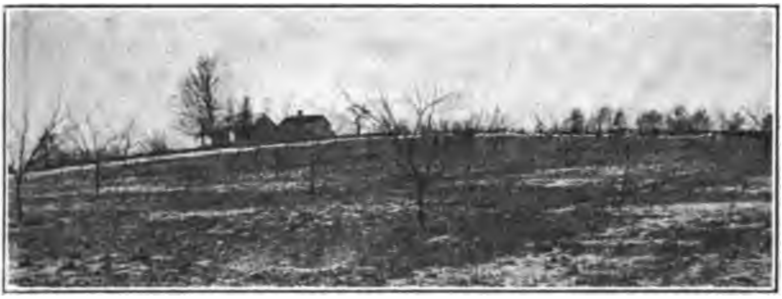

Fig. 50. A young apple orchard in which the trees are planted 36x40 feet apart, without fillers.

Table No. IV. will show the number of trees per acre planted at various distances by the rectangular and hexagonal systems. These figures will vary somewhat when larger areas are considered.

TABLE IV.
NUMBER OF TREES PER ACRE AT COMMON DISTANCES APART.

DISTANCE APART EACH WAY	RECTANGULAR SYSTEM	HEXAGONAL SYSTEM
15 feet	193	221
16 "	170	196
18 "	134	154
20 "	108	124
22 "	90	104
25 "	70	80
28 "	56	64
30 "	48	55
32 "	43	49
33 "	40	46
35 "	35	40
36 "	34	39
40 "	27	31
45 "	22	25

Double or filler planting. For the first few years in the growth of an orchard there is a good deal of unnecessary space between the rows. This space is often used in the growing of earlier maturing kinds of fruit or "fillers." Before discussing the various methods of laying out an orchard, it therefore becomes necessary to consider double planting or what has come to be called the filler system of planting. The ideal filler is a quick-growing and early maturing tree that will produce the maximum amount of fruit within the few years that it has to live, and one that will least affect the welfare of the permanent trees. As soon as the fillers begin to interfere with the natural growth of the permanent trees, they must be removed. (See fig. 51.) There is a difference of opinion with regard to the use of fillers. The chief objection raised by those opposed to the practice, is that the fillers are likely to be left too long, resulting in injury to the permanent trees. Such a result, in reality, would be the fault of the man rather than that of the

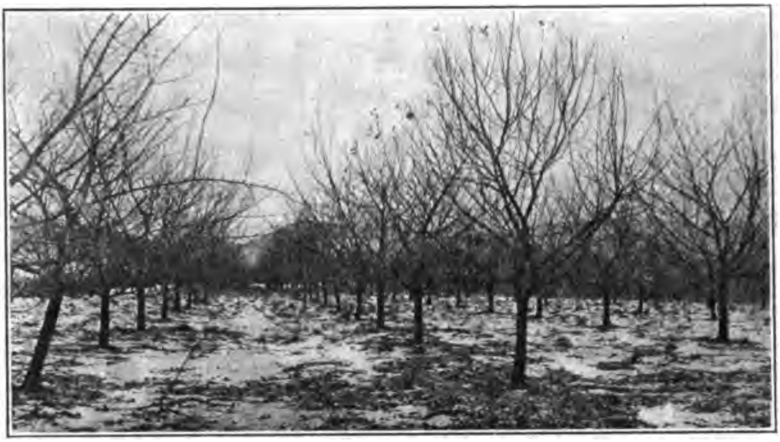

Fig. 51. A Baldwin orchard with McIntosh fillers. The fillers must be removed very soon to prevent injury to the permanent trees.

system. The grower, for the benefit of the remaining portion of the tree, cuts out superfluous branches, so why should he hesitate to remove superfluous trees when by so doing the remaining trees will be benefited? In either case it is simply a case of removing part of his fruit-bearing structure for the sake of getting better returns in the future. It should be remembered in this connection that the fruit is borne largely on the surface of the tree, and that when the trees become crowded together the surface is very greatly reduced. Assuming that the grower knows when fillers should be removed and that he has the courage to remove them, the question to be decided is whether it is more profitable to use fillers or to use the space between the rows for growing vegetables, small fruits, or other crops.

In Connecticut the peach is more largely used for interplanting than any other kind of fruit tree. In many respects the peach is well suited to the purpose. It matures early and fair crops are often obtained three or four years after planting. The objection to this kind of filler is that the treatment for bearing peach trees is somewhat different from that demanded by young, growing apple trees. If the apple trees should suffer from this cause it is again the fault of the man. The grower should keep in mind that in such cases of mixed planting, the apple is entitled to first consideration and the filler should be regarded strictly as a secondary

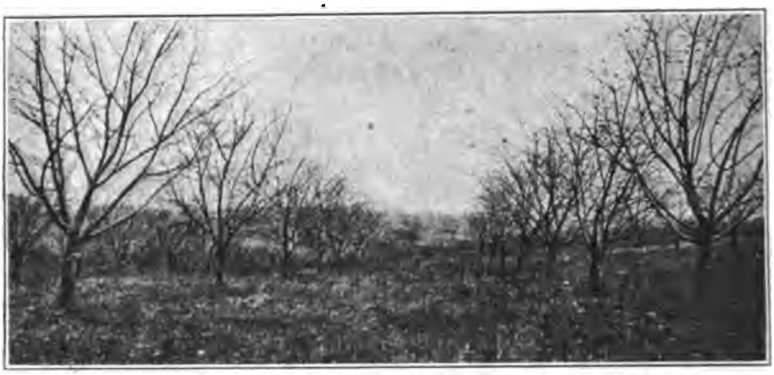

Fig. 52. A good apple orchard seriously injured by leaving peach fillers too long. The fillers were removed the year before this picture was taken.

matter. Plums and cherries are open to the same objection raised against the peach, but it is probable that any of these stone fruits in the hands of the intelligent fruit-grower may be successfully used as fillers. (See fig. 41.)

The use of early maturing varieties of apples as fillers has been strongly recommended during recent years. The apple makes a slower growth than the peach and returns come in much more slowly. This objection is offset however, by the fact that the apple filler may be retained in the orchard much longer and a great many more crops secured. Five or six and often as many as ten crops of apples may be secured, while it is seldom that more than two or three crops can be taken from peach fillers without injuring the permanent trees. The profit from two crops of peaches is very likely to exceed that from the many apple crops, but it is not fair to judge their relative value from this standpoint only. The apple fillers may have a better influence on the permanent trees and, on account of their slower development, may permit the growth of other crops between the rows for several years. The apple filler is more satisfactory where the permanent trees are widely spaced and it is entirely unsuited to closely planted orchards.

The small growing and early maturing varieties such as Yellow Transparent, Oldenburg, Bismarck, Wealthy, Wagener, Ontario, and Missouri Pippin, are the most suited to use as fillers. Jonathan may also prove to be desirable for this purpose. Ben Davis and Gano are largely used as fillers in some sections, but on account of their inferior quality, they are not recommended for planting in New England. There is little difference among the varieties of peaches for this purpose. The pear, on account of its susceptibility to blight under intense cultivation, is not suited to interplanting.

Many of the Connecticut fruit-growers have the necessary intelligence and courage to handle successfully an orchard on the filler system. But there are undoubtedly some, who for the sake of earlier returns, are likely to favor the fillers at the expense of the permanent trees and for the sake of getting one or two additional crops, are likely to injure seriously the shape of the trees of the main planting. The growers of the latter class are advised to set their trees at moderate distances and to grow among them some kind of a crop such as potatoes, corn, or vegetables that require cultivation during the early part of the summer. Even then, there is danger of growing these crops too near the trees and of not supplying the necessary plant food to make up for that removed from the soil by the secondary crop.

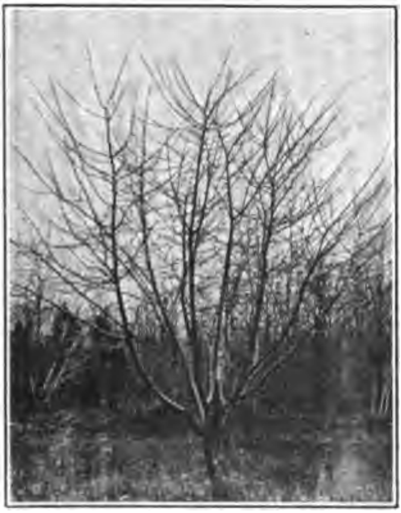

Fig. 53. A 13-year-old apple tree injured by leaving fillers in the orchard too long. Observe the long, slender, upright branches.

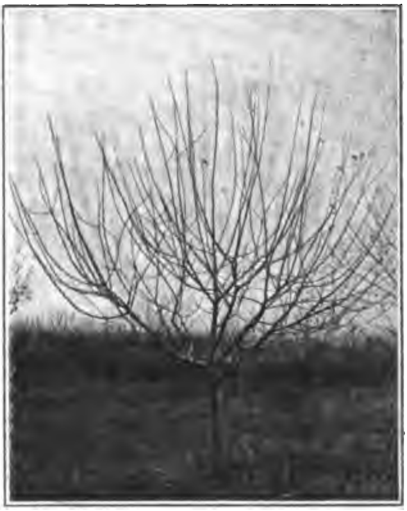

Fig. 54. A well-shaped tree. This tree was grown in an orchard without fillers. Compare with fig. 53.

Systems of Planting. The most important thing to be considered in laying out an orchard is the equal distribution of the trees.

There are several well-defined systems, but only three need to be considered here. These are the *square* or *rectangular*, the *quincunx*, and the *hexagonal* systems. The choice of any one of these systems will depend largely upon whether the orchard is intended to remain as it is originally started, or whether some of the trees are to be removed when they begin to crowd.

In the *square* or *rectangular* system, the one usually followed in New England, the rows run at right angles, leaving each set of four trees in the form of a square or rectangle, depending upon whether the trees are planted the same distance apart each way. The chief objection to this system is that the trees are not equally distributed, there being a large open space in the center of each set of four trees. When fillers are to be planted and thinned out later, this system is very suitable, for the fillers may be removed without affecting the arrangement. As shown in Plate I, fig. 1, the trees may be started say, 20 feet apart, giving 108 temporary and permanent trees to the acre. When they begin to crowd, the fillers or temporary trees which compose the alternate diagonal rows may be removed, leaving 54 trees to the acre, as shown in Plate I, fig 2. It will be seen that the trees are still in small squares (28.28x28.28 feet) running cornerwise of the orchard and in larger squares (40x40) feet, with a tree in the center, running across the field. These center trees may be called semi-permanent trees. They may either be the same as the fillers or the permanent trees, and if necessary, may be removed later, leaving twenty-seven trees to the acre, forty feet apart each way.—Plate I, fig. 3. To relieve the crowding, it is not usually necessary to remove all of the fillers at once, and this system allows two thinnings without seriously affecting the arrangement. This system is not so well adapted to orchards planted without fillers as either of the other systems.

In the *quincunx* system the trees are arranged in squares with a tree in the center. It is the same in arrangement as the rectangular system partially thinned, as shown in Plate I, fig. 2. The extra tree in the center of the groups allows twice as many trees to the acre as the straight rectangular system, and the trees are more evenly spaced. It is also suited to filler planting for the trees in the centers of the squares may be removed at any time leaving the trees in larger squares.—Plate I, fig. 3.

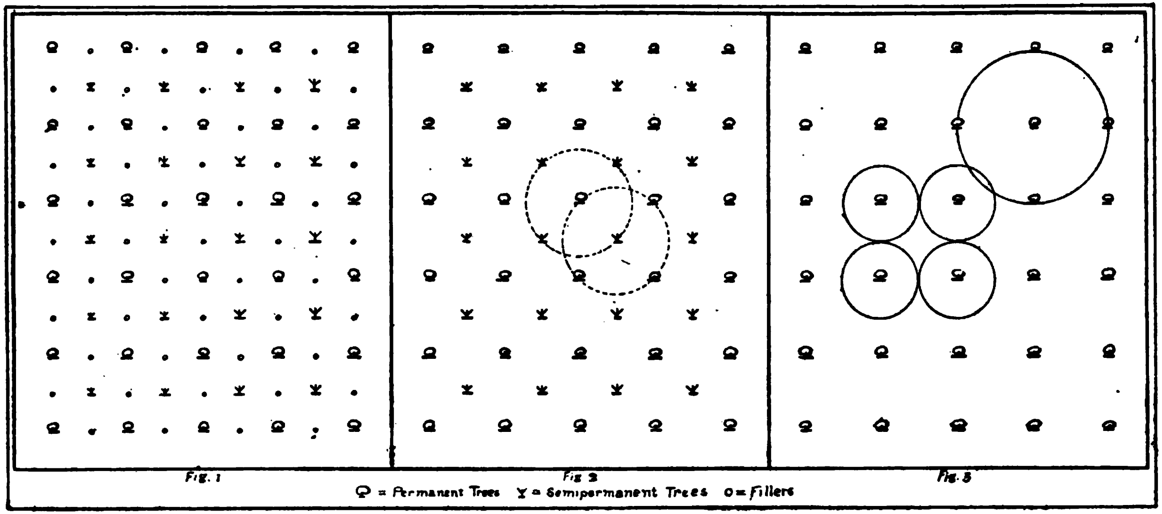

Plate I. The rectangular method of laying out an orchard. Fig 1 shows the arrangement of the trees with fillers. Fig. 2 shows the arrangement after the fillers have been removed, leaving just half the number of trees. This arrangement is sometimes called the quincunx system. The tree in the center of each group of four is a semipermanent tree and may be removed later if necessary. Fig. 3 shows the final arrangement after fillers and semipermanent trees have been removed. Observe the large, open space in the center of each group of four trees.

Where fillers are used the rectangular and quincunx systems are very similar, for one is readily changed to the other by the process of thinning. For use in orchards without fillers the latter system is preferable, but neither of them is as suitable for this purpose as the next system to be described.

The *hexagonal* system gets its name from the fact that the trees are arranged in hexagonal or six-sided groups, with a tree in the center, as shown in Plate II, figs. 2 and 3. The space between each group of four trees is diamond-shaped. The advantage of this system is that all the trees are equidistant, giving equal distribution of air, light, and soil. It is undoubtedly the best system if the trees are set so far apart that the orchard will never require thinning. On account of the equal distribution, more trees may be planted to the acre than by any other system. It is not so well adapted to filler planting as either the rectangular or quincunx systems. Where the trees are set sufficiently far apart, say thirty-six feet, an extra tree may be set in the center of each diamond, as shown in Plate II, fig. 2. This would place the trees in rows thirty feet apart, and eighteen feet apart in the row. As a result, the trees would be arranged in rectangles, 18x30 feet, giving them plenty of room one way, but making them somewhat close the other way. Trees planted in this way may be retained longer than when they are planted but eighteen feet apart each way. Following this method, eighty trees to the acre may be set, half of which would be fillers. If fillers are used in this way, it would be advisable to have the closer planted rows run east and west to admit more sunlight between the trees. If the distance between the permanent trees is increased, say to 42 feet, a filler may be placed between each pair of permanent trees in every direction. This would retain the hexagonal arrangement, but the hexagons would be only half the size of those formed by the permanent trees. With such an arrangement there would be four times more fillers than permanent trees. When the trees commence to crowd the thinning may be done by removing every alternate row across the field.

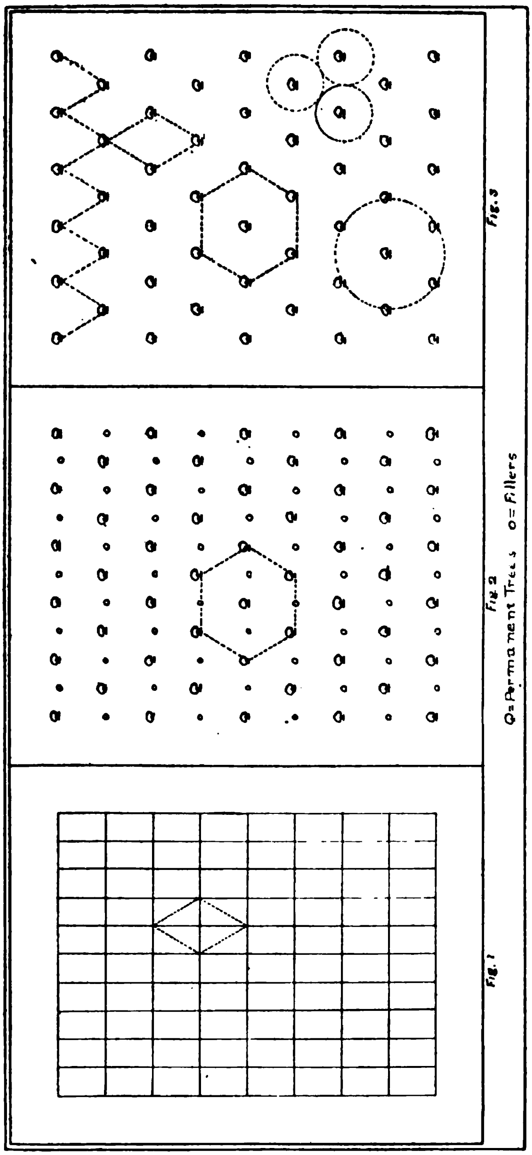

Plate II. The hexagonal method of laying out an orchard. Fig. 1 shows the method of marking off the field. Fig. 2 shows the arrangement of the trees with a filler in the center of each group of four permanent trees. Fig. 3 shows the arrangement of the trees after the fillers have been removed. Observe that the trees are equidistant from each other and that there is but a small, open space in the center of each group of three trees.

leaving the fillers in the center of the diamonds for a few years longer. While the rectangular system seems to be better suited to filler planting, the hexagonal method undoubtedly gives the best distribution of the trees after the fillers are eventually removed.

Setting the stakes. The determination of the correct position of the trees is often one of the most difficult tasks in connection with the starting of young orchards. The problem is a more serious one when large areas are considered and when the location selected is on irregular and uneven land. For convenience in cultivation, and also for the sake of appearance, the trees should be set in such a way that they will be in line in all directions. With this in mind it is usually advisable to indicate the position of each tree by a stake, and to lay out the whole field before setting the trees.

In square or rectangular fields the stakes for a row of trees on all sides of the orchards may be set by measuring the distance into spaces of the required length; for example, if the trees are to be set 40 feet apart each way on the square method, the stakes are placed every 40 feet on all sides of the field. The position of the intervening trees may be readily determined by sighting between the stakes on the opposite sides. On small acres the land may be marked off with a line connecting the opposite stakes, in both directions. The point of intersection of these lines indicates the position of the trees. On larger areas the position of the trees is usually determined by sighting across the field or by the use of a modified corn-marker. Sometimes a plow is used to open up a furrow in both directions.

Before attempting to lay out a field that is irregular in outline, it must first be squared off in such a way that the rows running across the field will be at right-angles to the rows running the other direction. A base line running along a straight side of a field is first chosen. If there is no straight side, a straight line running along the longer side of the field may be established. At right-angles to this straight line and near each end, may be projected two other lines. On small areas this may be done with two straight edges and a carpenter's square, but on large tracts this method is not sufficiently accurate. The best and most reliable method is that described in fig. 55. At the desired point (A) on the base line a stake is set, and exactly 60 feet from this on the same line another stake (B) is set. By stretching a string 80

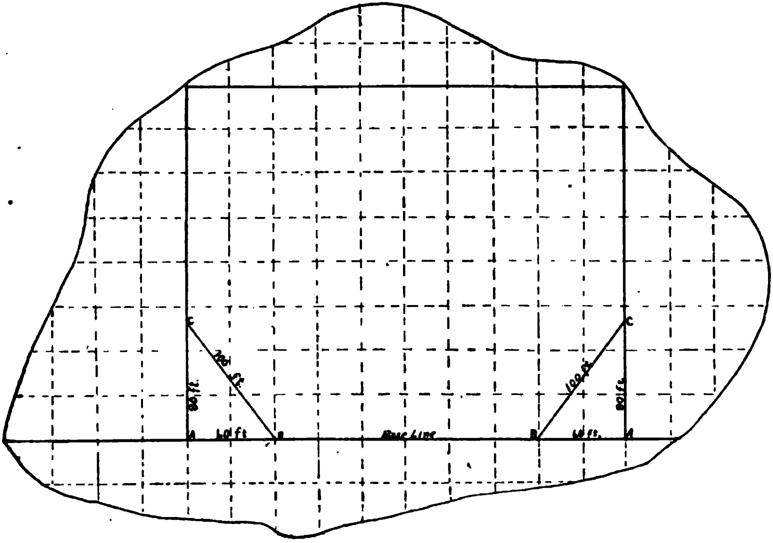

Fig. 55. Diagram showing method of squaring off an irregular field.

feet long from the first stake (A) and another string 100 feet long from the second stake (B) and by bringing the two ends together at (C) the position of the third stake may be determined. Then the desired line is drawn from A through C to the other side of the field. The same operation is repeated near the other end of the field. The distance between the rows, one way, may be marked off on the projected lines and the distance between the rows, the other way, may be indicated on the base line and also on the line parallel to it on the opposite side of the field. The rows in both directions can be extended to the margin of the field.

On hilly lands it is often very difficult to get the trees lined up properly. In such cases, telephone wire is sometimes employed to stretch across the field. To indicate the position of the trees a smaller wire may be wound around and soldered to the larger one at the required distances. The telephone wire is stretched tightly and a stake set at every point indicated by the soldered wire. In the hollow places, where the wire is far above the ground, a plumb-bob may be necessary to find the exact position where the stake should be set. Twine, on account of its stretching character, is unsuited to this purpose. The main point in measuring off

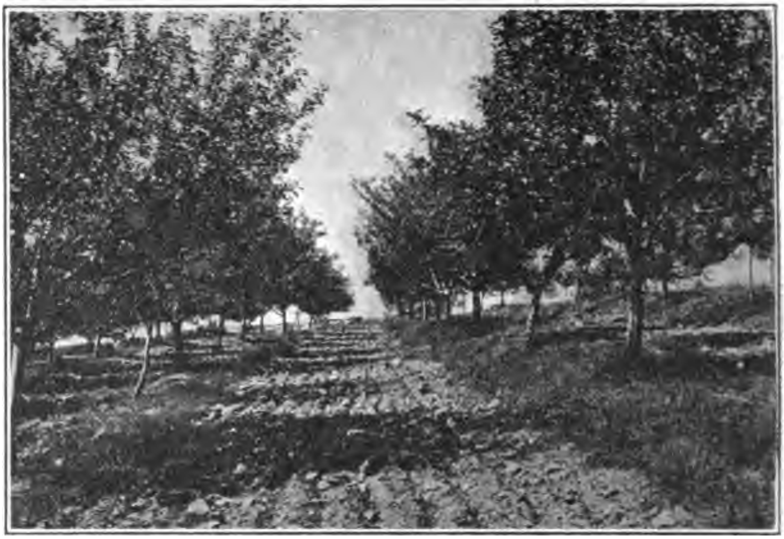

Fig. 56. A terraced orchard. Observe the strips of sod along the rows of trees.

uneven land, is in keeping the measuring line level. On steep hillsides, where cultivation is impracticable in any way, except parallel with the slope, the trees are often planted on terraces. These terraces are formed by leaving an unplowed strip of land along or between the rows. (See fig. 56.) Where the slope is irregular it is very difficult and almost impossible to line up the trees properly and at the same time have the terraces follow the lines of trees. In such cases, the terraces, with a row to each terrace, are allowed to follow the contours of the slope, and the trees thus are arranged in curved, instead of straight rows. Where the slope is steep the terraces are made somewhat farther apart so that the trees will not be too close together. In view of the abundance of available land that is well suited to orcharding, it is seldom advisable to select such land, that cannot be regularly laid out and conveniently cultivated.

When laying out the land for the quincunx system of planting, lines should be drawn midway between the other rows in both directions; that is, when the quincunx group forms a square 40x40 feet, the field must be marked out by lines 20 feet apart each way. The stakes for the trees of the even rows are set opposite the spaces of the odd rows.

The setting of the stakes for the hexagonal system seems to be somewhat more difficult, but when once understood, it is a very simple process. As may be seen from Plate II., fig. 1, it does not differ materially from the laying out of an orchard on the rectangular plan. Lines are drawn across the field in both directions, but in all cases, the distance between the lines running one way of the field, compared with that of the lines running the other way, is in the proportion of three to five. In laying out an orchard in which, for example, the trees are to be 36 feet apart each way, the distance between the lines running one way way would be 18 feet (one-half of 36) and that between lines running the other way would be 30 feet. (Eighteen is to thirty as three is to five.) The stakes are then placed in the same manner as suggested for the quincunx system. The position of the fillers in the center of the diamond groups may also be located with this same system of lines. If more fillers are to be used, as previously suggested, lines 9 feet apart one way, and 15 feet apart the other way, will need to be drawn. A very simple method of laying out an orchard by this system, especially on uneven ground, consists in the use of a wire triange, like that shown in fig. 57. This triangle should be made just the size of one-half the diamond formed by four trees;

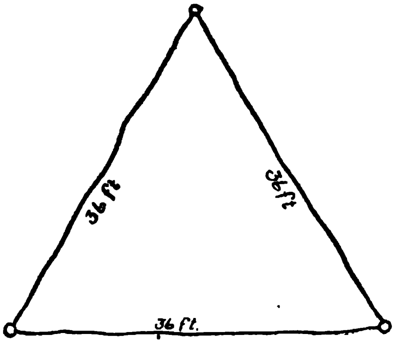

Fig. 57. A wire triangle used in laying out an orchard after the hexagonal system.

that is, each side of the triangle should represent the distance between the permanent trees. The wire should be connected at each angle by means of a ring. The triangle is carried around by three people and the stakes located as shown on the margin of fig. 3, Plate II. If the triangle is always kept tightly drawn and held on the level, there should be no trouble in correctly locating the stakes, even on very uneven ground.

PREPARING THE TREES FOR PLANTING

The treatment that a young tree should receive before planting consists chiefly in pruning the tops and roots. The main object of such pruning is to readjust the balance between top and root which in the process of digging, is somewhat disturbed.

Trimming the roots. While a large root system is an indication of a vigorous tree, it is not essential to the successful development of a tree. It has been found by experiment that trees with their roots severely cut back thrive just as well as those with elaborate root systems intact. The fibrous roots on a young tree are of no value, for these are always killed in transplanting and the tree throws out a new root system. The vitality of a young tree, then, depends more upon the energy stored up in its stem, than upon its root development. This is an important point, for a tree with a small root system is more expeditiously planted than one with an elaborate system. All mangled roots should be cut off cleanly and all the main roots should be cut back to about three or four inches of the trunk.

Pruning the top. Some growers leave the pruning of the top of the trees till they are set out into the field, but it would seem that the work might be more conveniently done before the trees are set. This would so reduce the bulk that the trees would be more conveniently handled, and would obviate the necessity of walking over the whole orchard to prune the trees after planting. The ultimate shape of the tree depends largely upon how it is pruned when set. With yearling trees the operation is very simple and consists simply of cutting off the top at a point where it is desired to form the head. With most varieties the head should be started not more than two feet above the graft union, but with some naturally spreading varieties, like Rhode Island Greening, for example, the head would be much better started at a point three feet from the ground. With trees two or more years old, the heads, which have been formed in the nursery row, are often too high. In such cases the entire head should be removed and the trees induced to form new heads. If the heads are in the proper position, the necessary pruning consists simply in cutting out unnecessary branches and in cutting back the remaining three or four branches to within about 6 or 8 inches from the stem. (See figs. 58 and 59.)

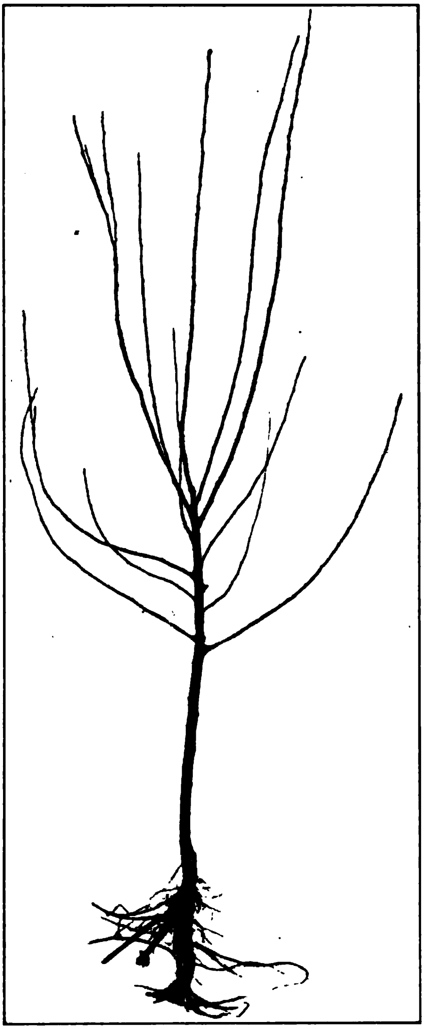

Fig. 58.

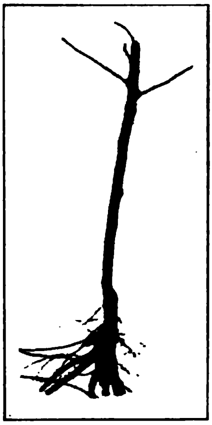

Fig. 59.

A 2-year-old nursery tree before and after pruning. This tree was not headed in enough the first year and it was therefore necessary to remove much of the top.

The San Jose scale. The reputable nurserymen are very careful to keep their stock free from scale, and most of them are provided with a fumigating house for the purpose and fumigate all their trees before they send them to their customers. Notwithstanding these precautions, the introduction of the scale into uninfested sections may usually be attributed to the planting of infested nursery trees. The most careful examination is not sufficient to detect the presence of scale, for the insects often hibernate in small crevices in the bark and under bud scales. Before planting the trees in uninfested sections, it is therefore important that they should be either refumigated or dipped. The expense in connection with the fumigation or dipping is very insignificant compared with the cost of spraying the trees a few years later.

Fumigating nursery stock consists in subjecting the trees to the fumes of hydrocyanic acid gas for a period of 30 to 45 minutes. The gas is made by using the following chemicals:

Water	4 fluid ounces
Sulphuric acid (high grade, 66° Baumé)	2 fluid ounces
Potassium Cyanide (98-100 purity)	1 ounce (av.)

This quantity is required for every 100 cubic feet of space. A tight box about six feet long by four feet wide and four feet deep, will answer the purpose. It should be supplied with a tight fitting

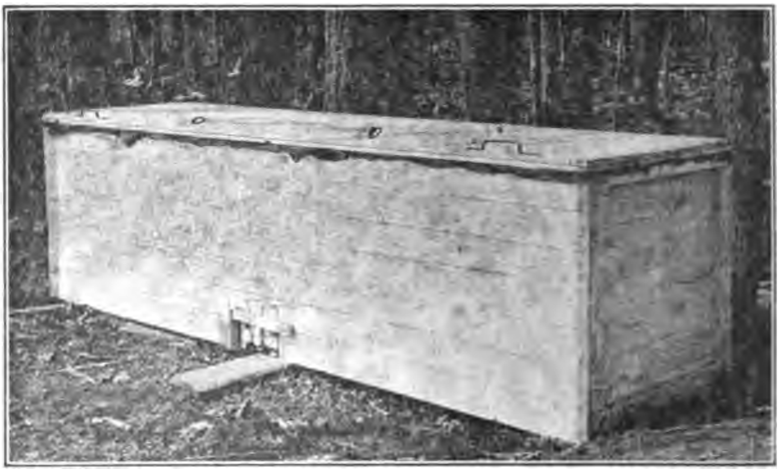

Fig. 60. A home-made fumigating box for the treatment of nursery stock.

cover the full size of the top, and adjusted so that it can be opened from a distance. (See fig. 60.) The box should also have a small slide door located at the bottom near the center. It is through this door that the chemicals are introduced. The acid and water are mixed together and placed in position, and when everything is in readiness, the cyanide is dropped into the liquid and the small door quickly closed. When the time is up the top should be removed by means of a rope through a pulley-block suspended above. *The fumes are extremely poisonous and should not be inhaled.*

The process of *dipping* fruit trees is probably more satisfactory for general use among fruit-growers than fumigation. Nurserymen, and others who are familiar with the use of potassium cyanide for this purpose, will probably find fumigation more convenient. While injury may follow either method, if the necessary precautions are not observed, there is less risk with the dipping process. Either the lime-sulphur wash or miscible oil may be used for dipping. The former is somewhat troublesome to prepare, and in view of the small quantity required for this purpose, the trouble would be unwarranted. Some of the prepared lime-sulphur solutions on the market have given good results when diluted with not more than eight parts of water. The miscible oils, of which there are many brands on the market, are well adapted to the dipping of the nursery stock. They should be diluted with about 15 parts of water. The only precaution necessary regarding the use of these oils is to shake up the supplpy of oil thoroughly before drawing any off and to make sure that it completely mixes with the water. A few drops in a glass of water should produce a milk-like solution, without any free oil on the surface. Miscible oil, on account of its spreading action is more likely to reach the insects that may be in protected positions.

The only thing necessary in the way of equipment for dipping is a tank deep enough to accommodate the young trees after pruning. A tank four feet deep, if kept well filled with the mixture, will answer the purpose. The trees are simply lowered into the bath, tops first, as far as the roots. They are then immediately withdrawn and the operation repeated. They are not allowed to remain in the liquid longer than is necessary to completely coat their surfaces with the mixture. A limited number of experiments with miscible oil suggest that the roots may also be dipped. Such a practice is not recommended, however, unless the roots are infested with woolly aphis.

SETTING THE TREES.

Time of planting. In this part of the country spring planting is usually preferred. The chief, and probably the only advantage, in fall planting is in getting the work out of the way. Trees for planting should not be taken from the nursery row till the leaves have fallen, and this is usually so late that the weather is not suitable for planting. If the soil should be dry, as is often the case in the fall, the trees are likely to dry out and be injured during the winter. As previously noted, it is advisable to purchase trees in the fall so as to get a better assortment and to have them ready for planting in the spring as soon as the weather is favorable. If this suggestion is followed and if soil and weather conditions are favorable in the fall after the stock arrives, the trees may be safely and profitably planted. If left till spring the planting should be done as soon as the ground can be conveniently worked.

Protecting the roots. When the ground is ready for planting, the trees are hauled to the land, distributed at convenient distances, and heeled in bunches. The roots should not be exposed to the air more than is absolutely necessary. Some growers believe in "puddling" the trees before they are taken to the field. This operation consists in dipping the roots in a semi-liquid made of clay and water. The clay forms a coating over the roots and

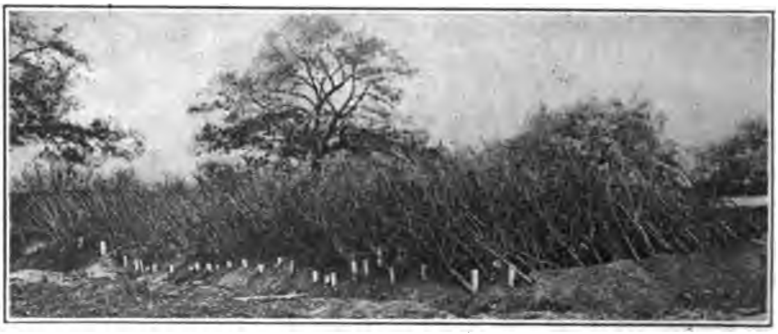

Fig. 61. Nursery trees heeled in for the winter.

prevents their drying out. It is claimed that fewer failures follow the planting of puddled trees than trees that have not been so treated. If the planting is done during drying weather, this treatment may prove to be an advantage, but where ordinary care is exercised in protecting the roots from the sun and wind, there is little need for such treatment. The trees for immediate planting may be distributed by using a barrel on a stone boat. If the barrel is kept about half full of water and the trees left in it until needed for planting, there will be no danger of their dying out.

The planting-board. Before discussing the actual work of planting, it becomes necessary to describe a device that is not so well known as it should be, the planting-board. This consists of a board about five feet long and four inches wide with a hole about an inch in diameter at each end, and a V-shaped notch exactly midway between the holes. A board of this kind is shown in fig. 62, and its use illustrated in figs. 63 and 64. Besides the board itself two stakes about a foot long, called guide-stakes, will be required to go through the holes. There are many modifications from this type but the principle is the same in all of them. The purpose of the planting-board is to locate the tree after the hole is dug, in exactly the same position as the stake stood. The board is placed on the ground with the notch adjusted to the stake that indicates the position of a tree. The guide-stakes are then pushed through the holes of the board into the ground. The board is then removed while the hole is being dug and replaced when the operation is completed. The tree is then stood in the hole in such a position that its stem passes through the notch.

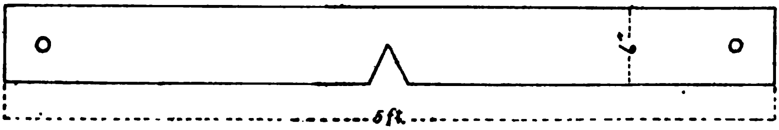

Fig. 62. A planting board used in locating the trees in the exact position indicated by the stakes.

Method of planting. The work of planting may be most expeditiously done with four men, or two men and two boys. One man operates the planting-board, another digs the holes, a third brings the trees and holds them in position, while the fourth man shovels

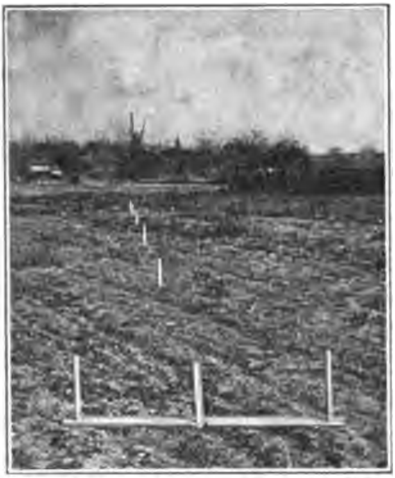

Fig. 63.

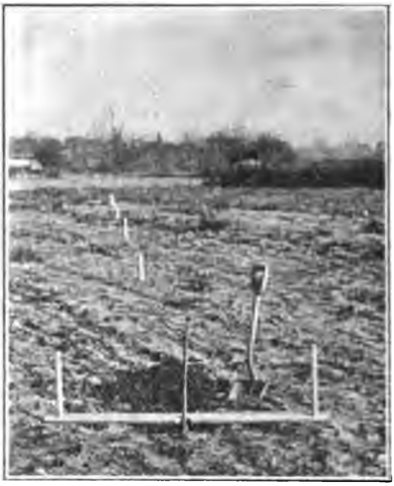

Fig. 64.

The planting board in position before and after digging the hole.

in the soil. Boys may be used to operate the planting-board and hold the trees. The man or boy who operates the planting-board after adjusting the stakes for the first hole, goes on to the second, adjusts a second pair of guide-stakes, returns with the board to the first hole, allows the other boy to locate the tree, and then he pulls up the guide-stakes and takes them with the board to the third tree-stake. While he is back at the first tree the hole is being dug at the second position and by the time he sets the guide-stakes for the third position it will be time to locate the tree in the second position. The boy who holds the tree while it is being planted gives it a shake with an up-and-down motion to get the soil scattered among the roots, and when about half the soil is in, he firms it with his feet. He then goes after another tree and leaves the man who does the filling in to give the final treading and to leave a loose layer of soil on the surface. The holes are dug just large enough to accommodate the roots. Under the best conditions, that is, where there are few stones and where there is nothing to impede the progress of the workmen another boy may be advantageously used to bring the trees as they are required. If two gangs are working on different rows, one boy may supply trees to both gangs.

The important point about planting a tree is to get fine moist soil firmly packed around the roots so as to avoid large air spaces. No fertilizer should be put into the holes when the tree is planted. It is not well to plant when the soil is wet, for handling it in this condition spoils its physical properties, and a baked soil is the result. Apple trees should be planted at about the same depth as they stood in the nursery row or probably one or two inches deeper.

The orchard record. A point that is often overlooked in the starting of an orchard is the making of a permanent record of the position of every variety. This is of special importance when many varieties are planted. To prevent the girdling of the young trees the small wired labels should be removed soon after the trees are set. These, of course, may be replaced by some kind of label that will not injure the tree, but no matter what kind is used, they are likely to become lost or misplaced, and there is no way of definitely determining the variety, except during the fruiting season. A plan, drawn to a scale, showing the position of every tree, will be of use also at planting time. This is especially true when fillers are used. The best time to make the record, therefore, is before the trees are planted. The various varieties may be designated on the chart by numbers. A list of the varieties with their corresponding numbers should accompany the chart.

CARE OF THE ORCHARD AFTER PLANTING.

Although it is the intention to discuss in a later paper the whole question of orchard management, it seems necessary at this time to make some suggestions with regard to the treatment of young orchards before they reach the bearing age, for the care of these is necessarily different from that of mature trees.

Cultivation. The early spring plowing should be followed by repeated cultivations. The aim should be to keep a deep, loose soil-mulch on the surface. The most successful apple-growers harrow their orchards every eight or ten days during this period, and oftener, if rains occur in the interim. This treatment liberates plant-food, saves moisture, and keeps the weeds down. Any tool that will keep the surface loose is suitable for this purpose. About July 15th, cultivation should cease and the ground sown to some good cover-crop, to be plowed under in the following spring.

A good cover-crop should make sufficient growth to protect the ground during the winter and spring and to supply abundant vegetable matter, which when turned under, will improve the physical condition of the soil and will contribute plant-food. The clovers and winter vetches are very suitable for this purpose. These crops are nitrogen gatherers and if a large growth is produced and turned under each year, there should be no need for the application of nitrogenous fertilizers. On the contrary, by repeated cover-cropping it is possible, especially in later years, to produce too much wood growth. In which case, instead of plowing under the cover-crop, it may be mowed and left on the ground. The object should be to produce a normal and uninterrupted annual growth. Trees that grow too fast are more likely to be injured by severe winters, to have a weak root system, and to form a structure that is not sufficiently strong to bear the weight of large crops of fruit. Most fruit-growers, however, are more likely to err in the other direction and allow their trees to become stunted, from which condition they may never recover.

Fertilization. The young orchard will require just enough feeding to keep it growing, and the amount of manurial elements applied should increase in proportion to the size of the trees. It is difficult to give any definite information on this point, for so much depends upon the character of the soil, the method of management, and the character of the crops grown between the trees. For the first year, just after planting, about two ounces of nitrate of soda and two ounces of muriate or sulphate of potash may be scattered around each tree, and a general application of about 400 pounds of basic slag and 300 pounds of raw ground-bone per acre, scattered over the whole area. The following year the basic slag may be omitted and the nitrate of soda and sulphate of potash doubled. The third and subsequent years, if a cover-crop is turned under and the trees are making satisfactory growth, the nitrate of soda may be omitted and a general application given consisting of 200 pounds of sulphate of potash and 300 pounds of raw ground-bone, to the acre. If at any time the cover-crop should fail, an application of about 100 pounds to the acre of nitrate of soda may need to be applied. It is believed that in the past too much attention has been given to the use of nitrogenous fertilizers for young trees, and that if more attention is given to the mineral elements the trees are likely to commence bearing earlier. The use of lime has also become necessary on many soils, and for this reason an occasional application of basic slag, which contains a large proportion of lime, may be substituted for the raw ground-bone.

While these suggestions and recommendations concerning fertilization may prove valuable for certain soils and conditions, there are undoubtedly many special cases where such advice would be of no value and may be entirely misleading. On many soils heavy applications of any one element of plant-food may be unnecessary. A soil that fails to respond to the application of any particular kind of plant food, is probably well supplied with that element. For these reasons, each grower should determine by experiment the peculiar fertilizer requirements of his soil.

Interplanting. In newly planted orchards the trees occupy a very small portion of the ground, and as a rule, some other kind of a crop is grown in the open space. The amount of space at the disposal of other crops will depend somewhat upon the kind of filler chosen. If peaches are used as fillers the ground should not be cropped for more than one or two seasons. Some reputable growers do not believe in attempting to grow any other crop, except cover-crops, when peaches are used as fillers. At least one grower in Connecticut has had excellent results from growing turnips, another has found late cabbage profitable. In some cases the spaces between the trees are planted to small fruits—strawberries, rasp-

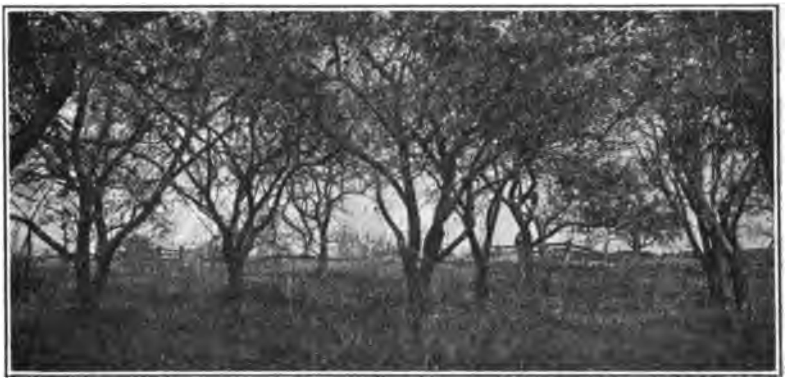

Fig. 65. The effect of close planting. Observe the long arms with a bouquet of leaves at the top.

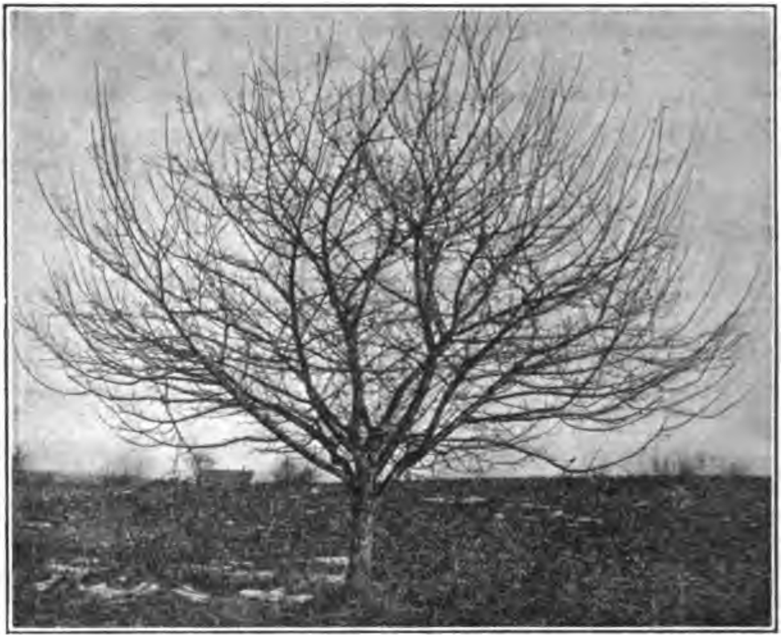

Fig. 66. A 10-year-old apple tree that has not been pruned since it was planted.

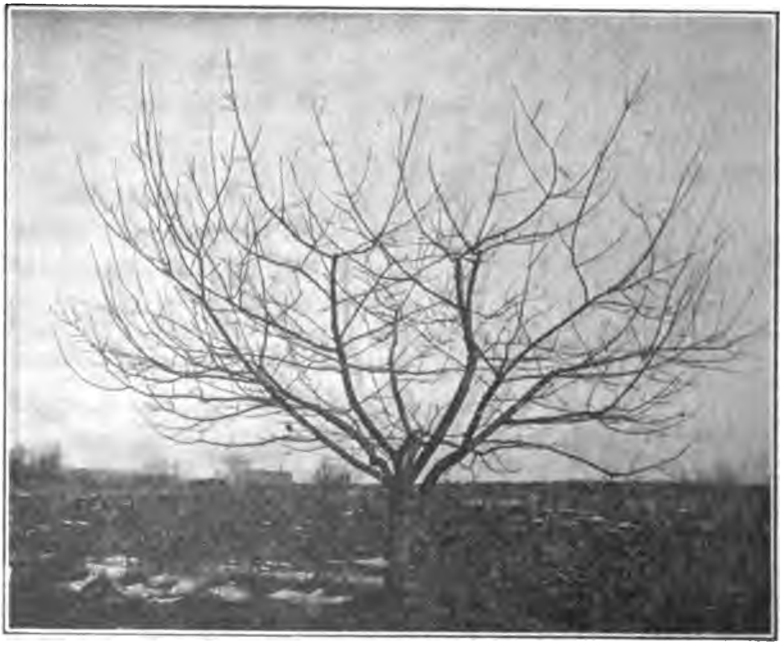

Fig 67. The same tree as shown in fig. 66, after pruning. Observe

berries, blackberries, gooseberries, and currants. Where no fillers are used the small fruits are very suitable. With apple fillers strawberries may be successfully grown, but the bush fruits, if used, are likely to be left in too long.

The best kind of a crop for this purpose is one that will require cultivation the early part of the season and will be out of the way in time for the sowing of a cover-crop. Crops of this nature are early cabbage, early cauliflower, early potatoes, beans, peas and radishes. Next to this is one that will require cultivation the early part of the season but will not necessitate the disturbing of the soil late in the season. Late cabbage, squash, turnips,, cucumbers and melons are of this class. A cover-crop may be sown when such interplanted crops are last cultivated. Late potatoes are not suited to the purpose, for the reason that in digging them the soil is much disturbed, producing a late growth and preventing the trees from properly ripening their wood. Corn has been grown in this way but usually has a bad effect upon the trees. It may be used without fear of injury if a wide space is left and kept cultivated along the rows of trees. The whole may be seeded to clover about July 15th, or at the last cultivation of the corn.

Whatever is grown in the orchard it should be looked upon as a catch-crop, and the returns from it as incidental. On the other hand, these companion crops, with careful management, may be made to pay for the care of an apple orchard up to the age of profitable production. An extra supply of fertilizer always should be applied for the use of these supplimentary crops and the greatest of care exercised in preventing them from interfering with the growth of the trees. From year to year the space for the use of the trees should be increased until finally it is given up entirely.

Pruning. Young apple trees require very little attention, with regard to pruning, until they reach the bearing age. The treatment should be one of training rather than of correction. That is, the trees should be gone over every year and encouraged to grow in the desired way. Several yearly trimmings will require no more time than a single pruning after a lapse of three or four years. Irregular pruning tends to throw the young tree out of balance, for the removal of so much wood in one year is always followed by a rank, succulent growth the following season. Unless such yearly treatment can be given, it is probably better to delay pruning entirely till the trees reach the bearing age, when the maturing of a crop of fruit will offset to some extent the invigorating effect of severe pruning. Figures 66 and 67 show a tree, before and after pruning, that has been treated in this way. If this method is employed, and if there is much wood to be removed, it would seem advisable to remove some of the wood during the summer and the remainder in the following winter or spring. Summer pruning is a devitalizing process and has the opposite effect upon the tree to that of winter pruning. It also tends to induce fruitfulness.

The regular annual treatment may be done any time during the dormant season, and the operation consists in removing unnecessary growth and moderately heading-in the stronger growing branches. Much may be done in the way of directing the growth of the branches by cutting back to a bud the points in the right direction. If a spreading habit is desired, the cut should be made about an inch above one of the lower or outer buds. With trees that are naturally spreading in habit, on the other hand, a more upright growth may be induced by cutting back to a bud on the upper or inner side of a branch. Some growers rub off the buds that they do not want to develop. This is a doubtful practice and entirely unnecessary. The important point in the whole matter is the development of a strong, well-balanced structure with a large bearing surface. In pruning and shaping the young tree the grower should keep in mind the matter of convenience. He should endeavor to keep the tree as low as possible to facilitate the operation of spraying and harvesting. There is a tendency among the best growers to develop a tree with an open space in the center of the head. This is a great advantage in the way of admitting more air and sunlight, but it is possible to carry the matter to such an extent that the branches of the tree may be injured by exposing them to the direct rays of the sun.

Protection from insects and diseases.. The necessity for spraying a young orchard does not seem so imperative as for a bearing orchard and for this reason it is often neglected. There are many kinds of insects and diseases that attack young trees and the ravage of any one of them may completely offset the good effects of tilling and feeding. The fruit-grower, therefore, should be on the watch for troubles of this kind.

The most careful growers always give one or two applications of Bordeaux mixture and arsenate of lead every year. The first of these is made just as the leaves begin to expand, and the second about ten days later. These may usually be depended upon to control the common diseases and the leaf-eating insects. If any of these pests should occur later in the season, additional applications may be necessary. Such insects as aphids or lice, borers, San Jose scale and other unusual pests will require special treatment, as outlined in Bulletin No. 56.

Protection from mice. Field mice are becoming more abundant and troublesome every year. Their increasing prevalence is probably due to the indiscriminate destruction of hawks and owls whose food consists largely of field rodents. Sod orchards and trees near the boundaries of cultivated orchards suffer most from this cause. Sufficient protection in cultivated orchards may usually be given by mounding up the fresh earth around the trees. When more protection than this is needed the trees may be wrapped with some material. Tarred building paper, or even newspaper, tied loosely about the trees is said to be satisfactory. Probably the best material for this purpose is a flexible wood veneer about one-eighth of an inch in thickness, that is being sold for the purpose. It usually comes in pieces about 8 inches wide and 24 inches long. One of these pieces is simply folded and tied around the trunk of each tree. This affords complete protection from either mice or rabbits and at the same time prevents the "scalding" of the trunk by the sun.

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Agricultural Experiment Station
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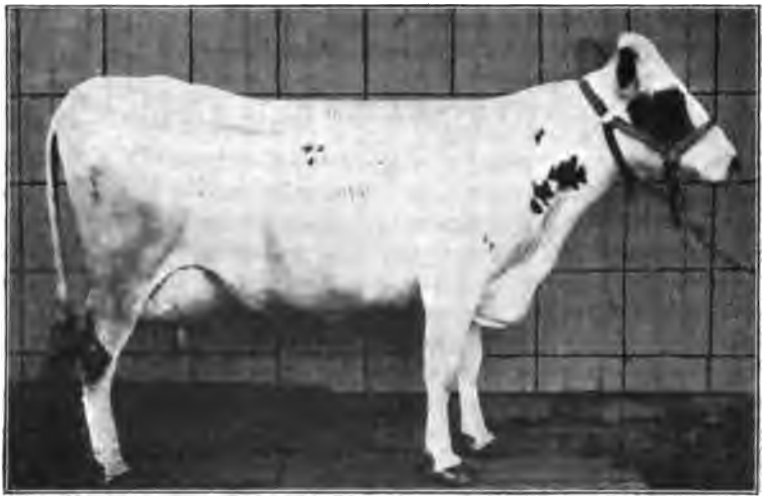

THE COST OF FEEDING HEIFERS

By J. M. TRUEMAN.

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Publications of the Station

AVAILABLE FOR FREE DISTRIBUTION

The following publications of the Storrs Agricultural Experiment Station are available for distribution, and, so long as the supply lasts, will be sent free to residents of Connecticut who desire them.

No. 29.	**Records of a Dairy Herd for Five Years.**
No. 30.	Spraying Notes for 1903.
No. 31.	**Food Value of a Pound of Milk Solids.**
No. 32.	**Protecting Cows From Flies.**
No. 34.	**Discussion of the Amount of Protein Required in the Ration for Dairy Cows.**
No. 35.	**The Camembert Type of Soft Cheese in the United States.**
No. 37.	**The So-Called "Germicidal Property" of Milk.**
No. 39.	**Pig Feeding Experiments.**
No. 40.	**Creamery Problems.**
No. 41.	**Spraying Notes, 1904-1905.**
No. 42.	**Quality of Milk Affected by Common Dairy Practices.**
No. 43.	**The Facility of Digestion of Foods a Factor in Feeding.**
No. 45.	**The Apple Leaf Miner.**
No. 46.	**Directions for Making the Camembert Type of Cheese.**
No. 47.	**Milking Machines.**
No. 48.	**Comparative Studies with Covered Milk Pails.**
No. 49.	**Petroleum Emulsion for the San Jose Scale.**
No. 54.	**Proprietary and Home-Made Miscible Oils for the Control of the San Jose Scale.**
No. 56.	**Control of Insects and Plant Diseases.**
No. 57.	**A Study of Some Connecticut Dairy Herds.**
No. 58.	**Camembert Cheese Problems in United States.**
No. 59.	**Bacterium Lactis Acidi and Its Sources.**
No. 60.	Bacillary White Diarrhea of Chicks.
No. 61.	Apple Growing in New England.
No. 62.	Apple Growing in New England.
No. 63.	The cost of Feeding Heifers.

REPORTS.

The Reports of the Storrs Agricultural Experiment Station for 1889, 1890, '94, '95, (Part III.), '96 (Part II.), '98, '99, 1900, 1901, 1905, 1906, 1907, and 1908-09, are available for free distribution.

Address all requests to the Director of Storrs Agricultural Experiment Station, Storrs, Conn.

THE COST OF FEEDING HEIFERS.

This bulletin gives the actual cost of feeding heifers from birth to 2 years old, in the Connecticut Agricultural College herd. The records are given for 5 heifers and these may be taken as typical, or average cases.

Feeding milk to calves. It will be noticed at once by stockmen that the expense of the first year was increased by feeding new milk for nearly a month after birth. This was done because we believe it pays to give the calves a good start. The plea is often made by dairymen that they cannot afford to feed any new milk to calves. The fact is, that they cannot afford to give the calf a poor start, and the best way to avoid doing that, is to give them new milk for at least two weeks, gradually changing after that to skimmed milk. We often meet with the complaint that skimmed milk cannot be obtained as all the milk goes to the city for direct consumption. Here again a mistake is made by the dairyman. He seems to forget that it is just as important to raise calves as to sell milk. In fact it is hard to see how he can keep on selling milk if he fails to raise calves. Skimmed milk should be as essential a part of the production of the dairy farm as the whole milk itself.

Early maturity. The gain in size, vigor, and earliness of maturity more than repays the farmer for the extra milk given the calf during the first few months of its life. Calves that are stunted are too small to breed at 15 months old and must often be fed almost a year longer than the well fed heifer, in order to get them ready to produce offspring, and begin their work of giving milk.

How to feed the calf. The following method of feeding calves has been found satisfactory and is regularly employed at the College farm. The calf is allowed to get its milk from the dam for the first four days, or until the milk is good for use. If the cow is a heavy milker and the calf a strong feeder, it is not allowed to have all the milk it will take, as there is danger of over feeding and producing indigestion and scours.

The calf is allowed to suck three times a day and the cow is stripped clean after each feeding. At the end of four days, the calf is given 1½ quarts, or 3 pounds of new milk at a feed 3 times a day, and this is kept up from 1 to 3 weeks, according to the vigor of the calf. Ordinarily a calf does not need feeding three times a day after it is 10 days old. At the end of that time, it may receive 5 pounds at a feed, morning and evening, which is practically 5 quarts per day. The new milk should not be increased beyond this amount, but as the calf needs more gradually add skimmed milk, and in 3 weeks time it may be fed wholly on skimmed milk.

After the calf is one week old, it should be given some grain to teach it to eat as soon as possible. A mixture of wheat-bran, ground oats and oil-meal in equal parts will be found excellent for producing growth, and bulky enough to start the development of the paunch. The calves will soon learn to eat the grain if after drinking, a little is put in their mouths for a few times. The meal should be fed dry immediately after the milk feed, and should be given only in small quantities, as much as will be eaten up clean in a short time; not more than ½ pint to a month old calf. Early cut hay, or rowen, should be placed where it can be reached easily and the calf will soon learn to eat a considerable quantity.

Feeding, the first summer. In this connection reference should be made to the necessity of giving early spring and winter calves a fair show the first summer. Unless the pastures are exceptionally good and the calves 5 or 6 months old when turned out, they should not be left to eat grass only. The pasture should be supplemented with grain. Bran, middlings, and oil meal; or bran, corn meal, and oil meal; or bran, ground oats, and oil meal, may be mixed in equal quantities by weight and fed at the rate of from 1 to 2 pounds per day according to the needs of the calf. The important thing is to watch the calves and see that they are doing well—growing strong and healthy. If they are not doing well, the feed should be changed and the conditions made more favorable.

Feeding the yearling heifers. The amount of feed given the young heifers can be easily estimated from the tables. The yearlings during 1908-1909 were fed silage, hay, and grain, as follows:

1 days ration	Hay 6 pounds Silage 18 pounds Grain 2 pounds

This ration was found fairly satisfactory for the smaller yearlings, but did not produce growth fast enough on the larger ones. The ration has been increased in grain this winter and the yearlings are now receiving 15 pounds of hay and 3 pounds of grain. The grain mixture consists of;

400 pounds bran
100 pounds corn meal
200 pounds middlings
100 pounds oil-meal.

A more satisfactory ration for yearlings than the above, was found to be,

Silage 20 pounds.
Hay 8 pounds.
Grain 2-3 pounds.

or

Hay (mixed with clover), 15 pounds.
Grain 3 pounds.

or

Hay (early cut or rowen) 15 pounds.
Grain 1 pound.
Roots (turnips or mangels) 20 pounds.

If roots are available, the yearlings will do well on good hay and from a peck to half a bushel of turnips or beets per day. The heifers could be raised better and at less cost, if clover hay was always available. It is a poor policy to feed the young stock on poor and refuse hay and to add no grain. They may be used to dispose of hay of inferior quality but it should be supplemented with grain or roots in such quantities as will keep them growing rapidly.

Cost of raising heifers to 2 years old. The tables show that the cost of feed for the two years is about $55.00. To this should be added about $5.00 per year for labor, $1.00 per year for bedding and about $2.00 per year for barn room, taxes, and interest on investment. This brings the total cost up to $71.00 at 2 years old. The manure should be worth at least $5.00 for the 2 years, which would make the net cost $66.00 This does not mean that good cows can be raised to milking age for the sum of $66.00. A good many of the heifers will have to be fed till they are 2½ years old or more. A certain percentage will fail to be good producers and will have to be discarded at a loss. Considering all these factors, it is doubtful if *good* heifers can be raised and put to work in the herd for much under $80.00 each. Good heifers are not dear at that price, however. They are young and vigorous and ready for a long life of usefulness and are cheaper at that price than the average cows bought at maturity for $60.

Summary of Cost:

1st year's feed	$28.00
2nd " "	27.00
Two " labor	10.00
Bedding $1.00 per year	2.00
Barn rent, insurance, interest, and taxes	4.00
	$71.00
Cr. by manure	5.00
Net cost	$66.00

Age at which to breed. The heifers fed only 2 pounds of grain per day during the winter of 1908-1909 were not as large as they should have been for their age, when they were turned out to pasture in the spring. This was a considerable loss to the herd as it necessitated waiting much longer before breeding them, than would have been necessary had they been larger. The loss was one of time as well as of feed. We were compelled to do without the milk they should have been producing, as well as to feed them for another six months, at a cost approximating $20.00. Heifers should be well enough grown to drop their first calves when from 24 to 27 months old. The objection is made that heifers bred too young will be dwarfed in size, and that, if the policy is continued, the race will deteriorate. This is not necessarily true. The heifers can be so fed and cared for as to be large enough and vigorous enough to keep up the vitality of the race, even if they come into milk at two years old. If this is done, two important things will have been accomplished. First, time and feed have been saved; and second, the heifer's energies are early turned towards milk production, before the habit of producing flesh and fat has been acquired. The latter reason may be considered fanciful by some, but there seems to be good evidence for the belief that coming into milk early in life, helps to develop and fix the milking habit. Even if this were not true, the saving in time and feed will amply repay the farmer for giving the young things extra care until they are two years old.

Pictures of live stock. Attention is called to the screen used for a back ground in taking pictures of heifers. The animal is always placed in the same position, as close as it can stand to the screen. The camera uses a 5x7 plate and is placed 15½ feet from the screen, with the lens level with the top of the animal's back. In the camera used, the center screw holding the camera on the tripod was plumbed over a stake 15½ feet from the screen. This brought the face of the lens, when in focus, just 15 feet from the screen. The spaces on the screen are 1 foot square and the first line is 1 foot above the plank on which the animal stands. The advantage of this definite position for taking pictures, is that the resulting photos are comparable. By this method, the growth of an animal may readily be noted for any length of time. The conformation of various animals can be compared. If some such scheme were adopted generally for picture taking, animals located any distance apart could be readily compared when their pictures were brought together. Note the growth from June 4th to November 12th in pictures shown. In Figure 70 Storrs Robin does not reach the four foot line by at least 3 inches over the rump, while in Figure 71 taken 6 months later, the rump is about an inch above the four foot line. (See Frontispiece).

Pictures may show the true shape, or they may easily be taken so as to distort the animal. It is a very common practice to take pictures of cows with the camera placed nearer the hind quarters than the front, in order to make the udder look relatively large. The reverse position is used in taking pictures of bulls, in order to make the neck and shoulders look large and masculine.

RECORD FOR ROSE HALE, GUERNSEY HEIFER, DROPPED DEC. 2d, 1907.

Date 1907	Weight	*Pounds of Food Eaten					Cost of Pasture	Total Cost
		New Milk	Skim Milk	Hay	Silage	Grain		
Dec.	at Birth	250	50	....	....	....	....	$4.13
1908 Jan.	136	....	504	54	33	11	....	1.81
Feb.	172	....	543	92	82	21	....	2.39
Mar.	208	....	554	133	89	31	....	2.83
Apr.	245	....	523	147	160	38	....	3.08
May	280	....	453	90	155	23	.20	2.54
June	....	....	440	....	....	31	.40	1.96
July	....	....	95	....	....	4	.40	.70
Aug.	....	....	....	....	....	....	.40	.40
Sept.	...	....	....	....	....	....	.40	.40
Oct.	....	....	....	36	120	13	.20	.85
Nov.	425	....	....	186	620	64	....	3.32
Total for 1st Year	....	....	....	....	....	....	....	$24.41
1908 Dec.	440	....	....	296	630	31	....	3.50
1909 Jan.	462	....	...	304	668	46	....	3.85
Feb.	485	....	....	420	....	56	....	3.36
Mar.	510	....	....	465	....	62	....	3.72
Apr.	538	....	....	450	....	60	....	3.60
May	555	....	....	225	....	30	....	1.80
May 16th to Oct. 31st	....	....	....	....	....	....	4.00	4.00
Nov.	6.80	....	....	300	450	90	....	4.05
Total for 2nd Year	....	....	....	....	....	....	....	$27.88
Total for Two Years	....	....	..	....	....	....	....	$52.29

*New Milk $2.00 per huudred, Skim Milk 25c per hundred, Hay, $12.00 a ton, Silage $4.00 a ton, Grain $30.00 a ton.

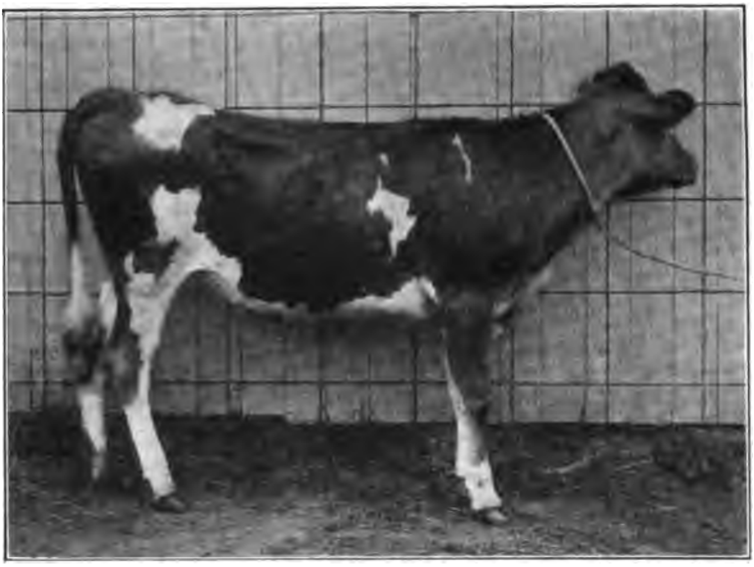

Fig. 68—Rose Hale—Age 1 year, 6 months.

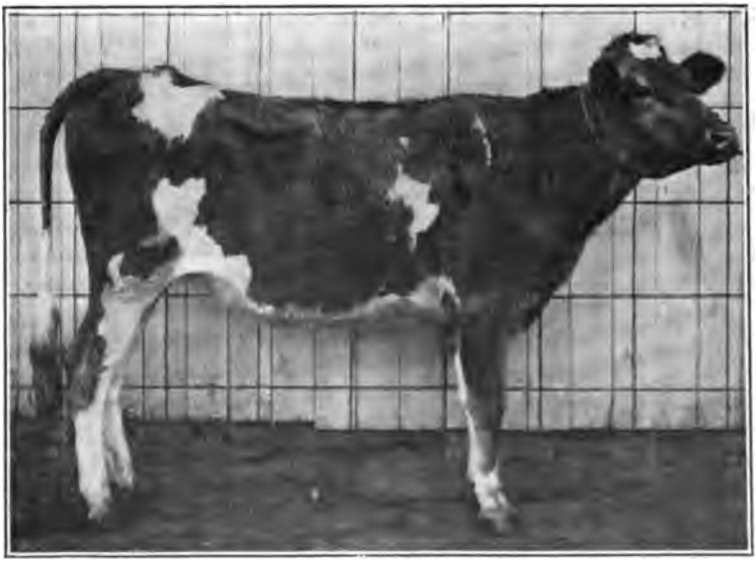

Fig. 69—Rose Hale—Age 2 years.

RECORD FOR STORRS ROBIN, JERSEY HEIFER.
BORN DEC. 30th, 1907.

Date 1908	Weight	Pounds of Food Eaten.					Cost of Pasture	Total Cost
		New Milk	Skim Milk	Hay	Silage	Grain		
Jan.	At Birth 55	343	....	....	....	....	....	$5.49
Feb.	95	142	230	40	....	6	....	3.18
Mar.	116	....	399	79	....	27	....	1.87
Apr.	145	....	385	100	42	32	....	2.13
May	188	....	404	66	106	19	.20	2.10
June	....	....	474	....	....	30	.30	1.93
July	....	....	396	....	....	34	.30	1.80
Aug.	....	....	372	....	....	38	.30	1.80
Sept.	....	....	250	....	....	....	.30	.92
Oct.	....	...	150	36	60	13	.15	1.05
Nov.	368	....	....	190	540	62	....	3.15
Dec.	375	....	....	248	620	31	....	3.20
Total for 1st Year	....	....	....	....	....	..	....	$28.62
1909 Jan,	385	....	....	247	620	46	...	3.41
Feb.	407	....	....	336	....	56	...	2.86
Mar.	423	....	....	372	....	62	....	3.16
Apr.	450	....	...	360	....	60	....	3.06
May	463	....	....	180	....	30	....	1.53
May 16th to Oct. 31st	....	....	....	....	....	....	4.00	4.00
Nov.	610	....	....	300	450	90	....	4.05
Dec.	618	....	....	310	465	93	....	4.19
Total for 2nd Year	....	....	....	....	....	......	....	$26.26
Total for 2 Years	....	....	....	....	....	....	....	54.88

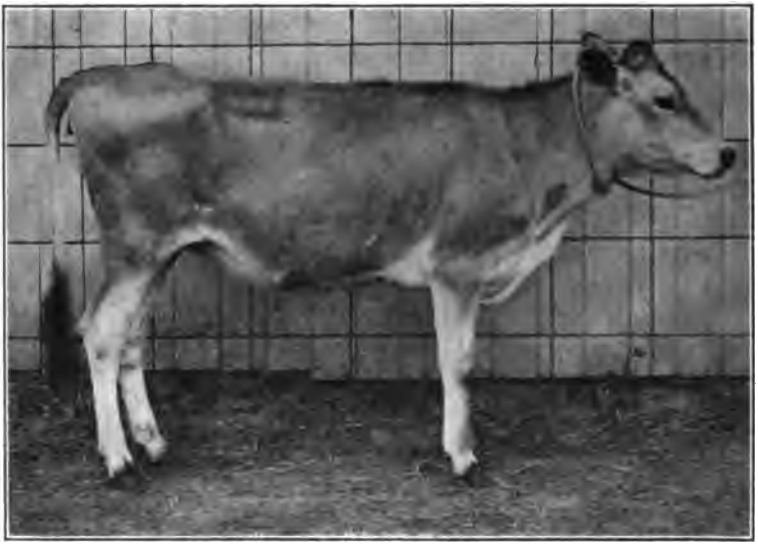

Fig. 70—Storrs Robin—Age 1 year, 6 months.

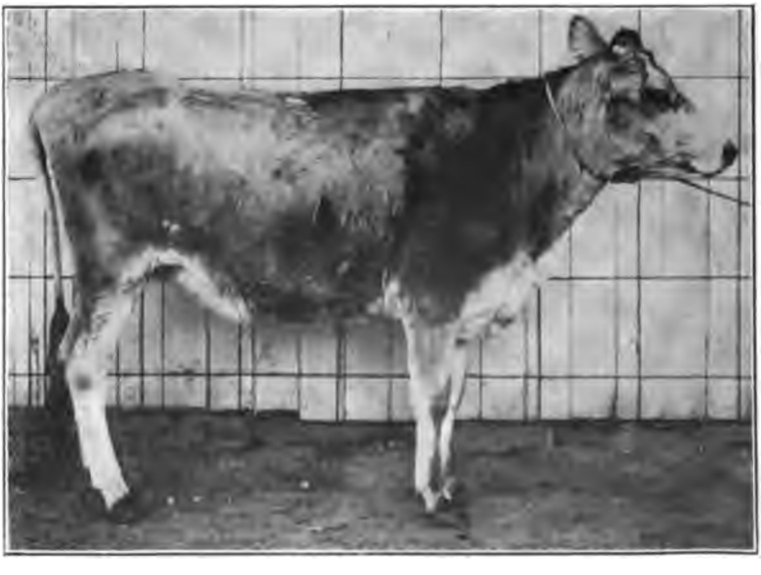

Fig. 71—Storrs Robin—Age 2 years.

RECORD FOR FAY DEKOL BURKE 3RD.
BORN JAN. 4th, 1908.

Date 1908	Weight	Pounds of Food Eaten.					Cost of Pasture	Total Cost
		New Milk	Skim Milk	Hay	Silage	Grain		
Jan.	At Birth 96	337	8	....	....	....	....	$5.41
Feb.	140	143	337	23	....	5	....	3.34
Mar.	181	....	554	69	....	27	....	2.20
Apr.	250	....	508	121	61	42	....	2.75
May	290	....	473	90	109	25	....	3.31
June	....	....	488	....	....	34	.20	1.80
July	....	....	517	....	....	40	.20	2.09
Aug.	....	....	235	....	....	19	.30	1.18
Sept.	....	....	....	....	....	....	.40	.40
Oct.	....	....	....	36	60	8	.30	.76
Nov.	480	....	....	190	461	42	....	2.69
Dec.	482	....	....	248	620	31	....	3.29
Total for 1st Year	....	....	....	....	....	....	....	$28.22
1909 Jan.	487	....	....	247	620	46	....	3.41
Feb.	515	....	....	420	....	56	....	3.36
Mar.	540	....	....	465	....	62	....	3.72
Apr.	577	....	....	450	....	60	....	3.60
May	612	....	....	225	....	30	....	1.80
May 15th to Oct. 31st	....	....	....	....	....	....	4.00	4.00
Nov.	830	....	....	300	450	60	....	3.60
Dec.	830	....	....	310	465	62	....	3.7
Total for 2nd Year	....	....	....	....	..	....	....	$27.21
Total for 2 Years	....	....	....	....	....	....	....	55.43

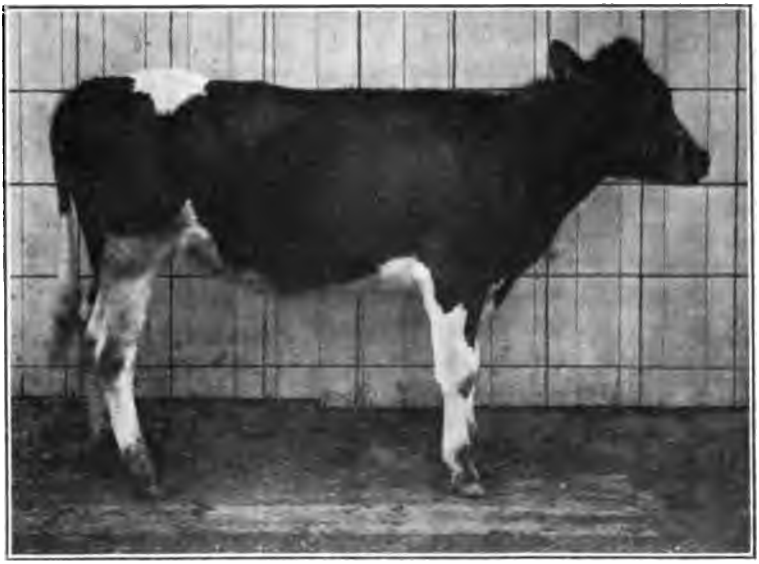

Fig. 72—Fay DeKol Burke 3rd—Age 1 year, 4 months.

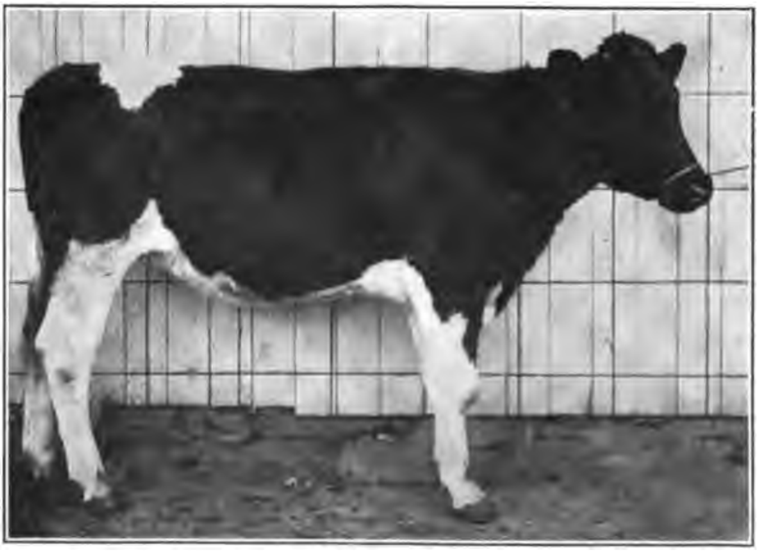

Fig. 73—Fay DeKol Burke 3rd—Age 1 year, 10 months.

RECORD FOR NELLIE 4th, GRADE JERSEY HEIFER, BORN JAN. 6th, 1908.

Date 1908	Weight	Pounds of Food Eaten.					Cost of Pasture	Total Cost
		New Milk	Skim Milk	Hay	Silage	Grain		
Jan.	At Birth 57	308	....	....	....	....	....	$4.85
Feb.	98	287	180	8	....	....	....	4.29
Mar.	123	....	521	46	....	22	....	1.91
Apr.	160	....	496	81	....	38	....	2.29
May	178	....	361	65	....	28	.15	1.86
June	205	....	384	....	....	24	.30	1.72
July	215	....	397	....	....	34	.30	1.80
Aug.	....	....	377	....	....	41	.30	1.85
Sept.	....	....	250	....	....	....	.30	.92
Oct.	....	....	150	36	60	18	.15	1.05
Nov.	400	....	....	184	380	62	....	2.79
Dec.	425	....	....	242	465	31	....	2.85
Total for 1st Year	....	....	....	....	....	....	....	$28.18
1909 Jan.	433	....	....	247	465	46	....	3.10
Feb.	442	....	...	336	....	56	....	2.84
Mar.	454	....	....	372	....	62	....	3.16
Apr.	510	....	....	360	....	60	....	3.06
May	538	....	....	180	....	30	....	1.53
May 16th to Oct. 31st	....	....	....	....	....	....	4.00	4.00
Nov.	665	....	....	300	450	90	....	4.05
Dec.	671	....	....	310	465	93	....	4.19
Total for 2nd Year	....	....	....	....	....	....	....	$25.93
Total for 2 Years	....	....	....	....	....	....	....	54.11

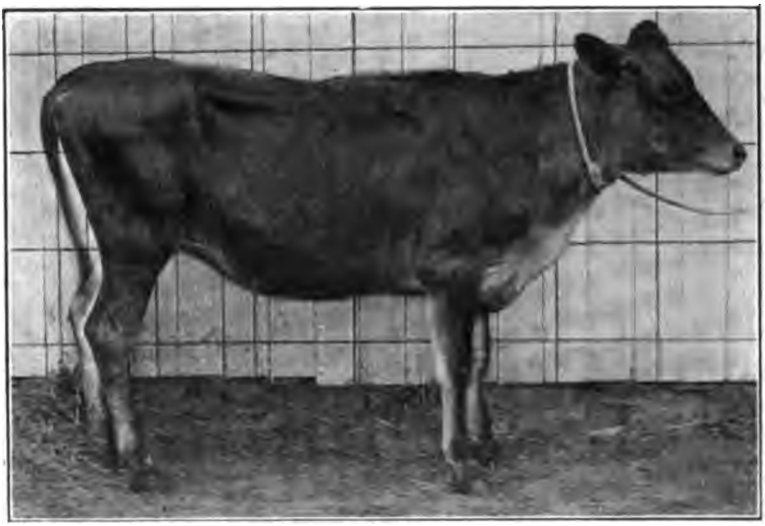

Fig. 74—Nellie 4th—Age 1 year, 4 months.

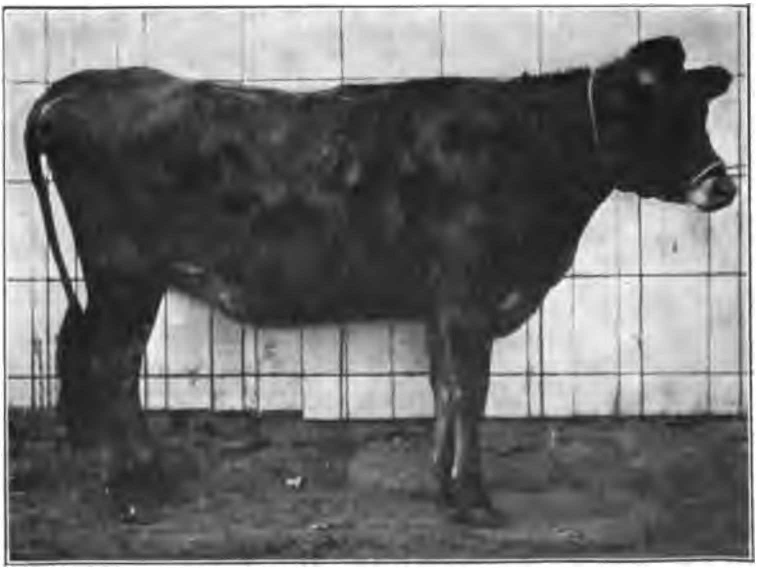

Fig. 75—Nellie 4th—Age 1 year, 10 months.

RECORD FOR CLARA 2ND, GRADE HOLSTEIN HEIFER, BORN APRIL 4th, 1908.

Date 1908	Weight	Pounds of Food Eaten.					Cost of Pasture	Total Cost
		New Milk	Skim Milk	Hay	Silage	Grain		
April	at Birth 110	470	36	4	....	....	....	$7.63
May	157	....	460	63	....	31	....	2.00
June	220	....	459	112	....	43	....	2.46
July	262	....	465	86	....	45	.15	2.50
Aug.	....	....	435	....	....	47	.30	2.10
Sept.	....	....	300	....	....	....	.30	1.05
Oct.	....	....	200	36	60	8	.15	1.08
Nov.	400	....	....	190	387	58	....	1.78
Dec.	405	....	....	208	465	27	....	2.59
1909 Jan.	408	....	....	247	465	46	....	3.10
Feb.	415	....	....	336	....	56	....	2.84
Mar.	440	....	....	372	....	62	....	3.16
Total for 1st Year	....	....	....	....	....	....	....	$32.29
1909 April	500	....	....	360	....	60	....	3.06
May	523	....	....	180	....	30	....	1.53
May 16th to Oct. 31st	....	....	....	....	....	....	4.00	4.00
Nov.	725	....	....	300	450	90	....	4.05
Dec.	728	....	....	310	465	93	....	4.19
1910 Jan.	....	....	....	310	465	93	....	4.19
Feb.	....	....	....	280	420	84	....	3.78
Mar.	....	....	....	310	465	93	....	4.19
Total for 2nd Year	....	....	....	....	....	....	....	28.99
Total for 2 Years	....	....	....	....	....	....	....	61.28

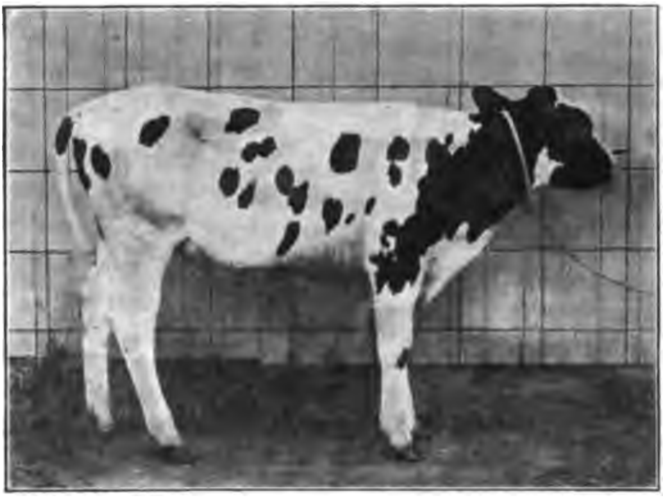

Fig. 76—Clara 2nd—Age 1 year, 2 months.

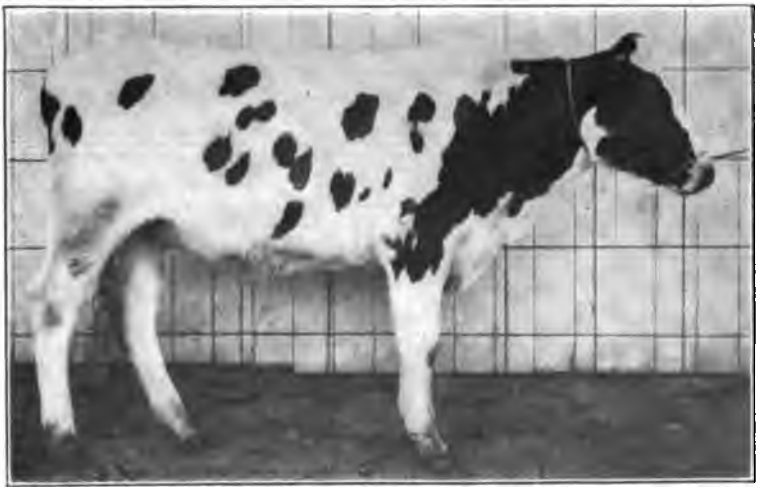

Fig. 77—Clara 2nd—Age 1 year, 8 months.